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LANDSCAPE MANAGEMENT

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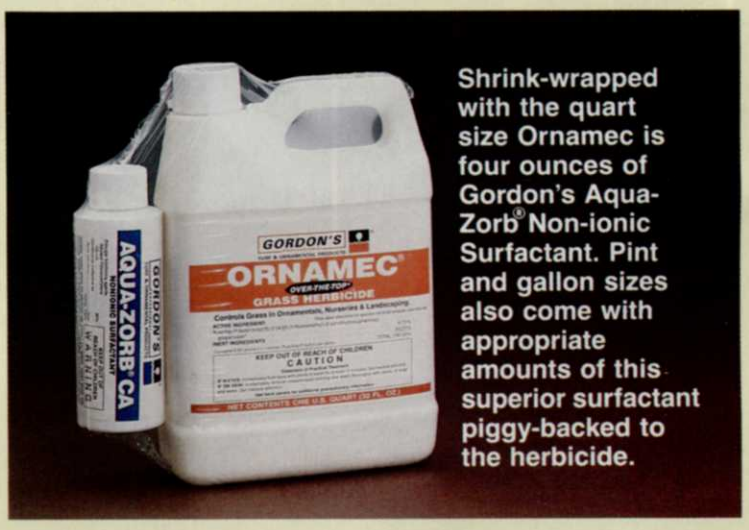
PBI/Gordon Corporation



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The trouble with a crop oil in this kind of situation is that its purpose is to dissolve the cuticle of a plant so the herbicide can penetrate the grass it is intended to control. Of course, the rub is that crop oil can also dissolve the cuticle of the ornamental you're spraying over, and thus endanger its life.

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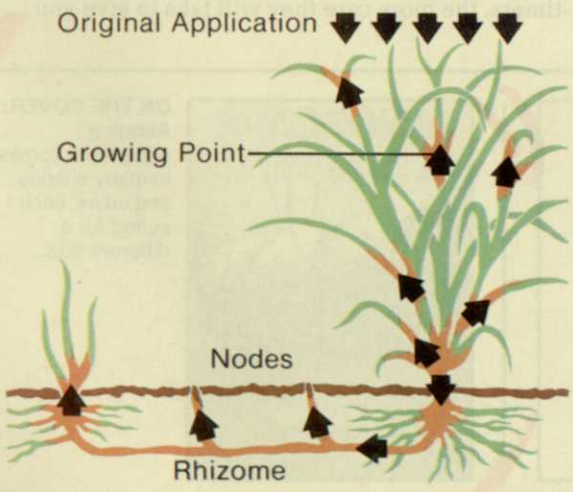

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More on 'Variety Not Stated'

■ The discussion of seed labelling continues.

Bob Oliger of Oliger Seed Co., Akron, Ohio, took exception to an article appearing in LANDSCAPE MANAGEMENT last November. It stated that purchasers of seed should be wary of "Variety Not Stated" (VNS) labelling.

"Half of the seed on the market is VNS," Oliger says. "That article casts quite a shadow on the common varieties. And any of the common-use grasses—if they're not premium—have to be labelled VNS."

Eliot Roberts, Ph.D., executive director of the Lawn Institute, finds himself partially agreeing with Oliger.

"If the seed is not a proprietary variety but it's grown with the standards of a proprietary, it's equivalent to a proprietary," says Roberts. "If Oliger puts high-quality VNS in his bag, he can do that. But another seedsman might put junk in the bag."

"We try," counters Oliger, "to handle all good quality seed. And I think all regional wholesale distributors carry similar lines. We kind of pride ourselves on our reputations."

Observes Roberts, "Although proprietaries are bred for better tolerances, there's always going to be a place for the common variety. Not everybody is interested in buying a Cadillac.

"But I really have to agree with your article: if you buy VNS, you really don't *know* what you're getting."

The bottom line? It's best to buy proprietary varieties. If you must buy VNS grass seed, make sure you're dealing with a reputable wholesale distributor.

Biotechnology to boom

■ Biotechnology will have a significant impact on agricultural markets during the next 10 years, say consultants at C.H. Kline & Co. Sales of biotechnology products are projected to reach more than $2 billion by 1995 (compared to $14 million currently). These products are also expected to eventually have an impact on the lawn and landscape market.

According to Kline's report, agricultural biotechnology will initially help evolve agricultural products, but holds the long-term potential to alter or revolutionize the animal health care, crop protection and seed improvement industries.

Current biotech sales include products in animal health therapeutics, disease diagnostics and micropropagated crop plants. By 1990, biotechnology-derived products will include genetically-engineered microbial insecticides.

American Cyanamid, Ciba-Geigy, ICI and Monsanto are active in these areas. Lubrizol, Sandoz, Hoechst, Merck and several other companies are also developing such products.

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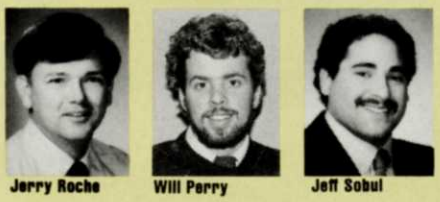

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Landscape architects, left to right: Bill Cathcart, Rob Sawyer, Walt Young, Bob Cardoza and Keith French, opened lines of communication with landscape contractors at the Landscape Industry Show in Long Beach, Calif.

INDUSTRY

Architects want open communication lines

A panel of five certified landscape architects from Southern California emphasizes the need for good communication between themselves and the contractor installing a design.

A concern of all the panel members involved cutting small portions of the design, most often to save money and without the knowledge or consultation of the architect.

"If necessary," says Rob Sawyer of Land Concern, Santa Ana, "let the landscape architect make the cut in the plans." Each architect emphasizes that consultation on the plan is only a phone call away.

"Time is of the essence," adds Keith French, of the Keith French Group, San Clemente. If problems arise during installation, "fix the problem first and then find out who's to blame."

Panelists also stressed the need for some understanding from contractors when a new architect is sent out to a job. Often the principal architect is not the one at the site. "I was scared to death the first time I went to a job," Sawyer recalls.

"There should be an education from the principal architect on down to the new people who they're sending out on a job," says Walt Young, Walt Young Assoc., Northridge. "They've got to know what to expect."

Bill Cathcart, Cathcart/Begin Assoc., Orange, "looks for an experienced contractor to 'break in' a new person." Sometimes, though, "even if they have the right answer, they get trampled on by the contractor," Cathcart says. "That gets me angry. You have to have that common respect."

"This is a committment," French calls his business and the contractor's business. "Everything I do is related to my business. You have to understand all aspects of the business, not to replace people with yourself, but to understand their functions."

Good advice for contractors, too.

LAWN CARE

Lawn care operators head off potentially damaging TV report

The Professional Lawn Care Association of Mid-America has headed off a potentially damaging television report. In the face of the report, by Stan Cramer of Channel 5 News in Kansas City, association president David Murphy presented the group's policies and provided explanations for practices, all resulting in an objective report by Cramer.

Cramer's original intent was to give a "burning condemnation" of continuous service and negative option agreements, said the PLCAMA newsletter. Cramer had information that some lawn service customers had called the Kansas Attorney General's office to complain about continued service without permission and heavy-handed collection techniques. Cramer's attempts at interviews with local companies apparantly were frustrated because his reputation for damaging reports preceeded him.

Murphy stepped in with two days of interviews in which he explained that companies had continuous service agreements with customers. He said that the "lawn service will take care of the lawn from season to season and year to year automatically" though the customer could cancel the service any time by prior notice.

"It is also the policy of our associ-

continued on page 11

LEGISLATION

LCOs', contractors' driving laws change

Drivers of vehicles carrying designated materials will soon need commercial drivers' licenses under regulations proposed by the Department of Transportation.

The DOT, under the Commercial Motor Vehicle Safety Act of 1986, will release guidelines July 15. They will include basic information for license exams, which will be administered by the states.

The list includes some 4,000 designated materials. Some used by lawn care companies and landscape contractors are chlorpyrifos, diazinon, 2,4-D, carbaryl, malathion and ammonium nitrate. They are listed in the 1987 Code of Federal Regulations, Title 49, Section 172.101.

States will have until 1992 to enact their licensing programs.

LAWN CARE *from page 8*

ation," Murphy continued, "that if a customer receives a service in the spring but refuses to pay on the grounds he did not order the service to be continued, the lawn service thanks them for calling and writes it off."

In short, says the PLCAMA, the report ended up as something of a public service announcement instead of a tongue lashing.

INDUSTRY

Contractor calls for established standards

Landscaping in Southern California is easily a multi-million dollar industry. In such a large market, and in the rest of the country, there stands a need for high standards, at least one landscape contractor believes. Certainly, he is not alone.

Dan Heiny of Allseasons Landscape Service in El Toro, Ca., in reference to the industry, hopes "we are trying to achieve the highest quality landscape we can attain. It takes a lot of personal drive to have high quality projects or prodding from others."

Dan Heiny

He notes that in Southern California there are a lot of "mow, blow and go" experts. "You have probably lost jobs because of them," he told attendees of his talk at the Landscape Industry Show in Long Beach April 20.

Heiny has found that many property managers and owners have not been educated about which companies will do the best jobs. "Low bidders often cause more grief than the money savings was worth," he comments. They "generally lead to a bad reputation for all contractors through lack of professionalism," he says.

Heiny adds there is a movement by the California Landscape Contractors Association to set standards for the industry. Standards, he says, will lead to better quality jobs. "(Better jobs) give the maintenance group better credibility, among other things."

Also, in the instance of a lawsuit, he explains, "the law looks to state-of-the-art for a particular area as the industry standard in the absence of an

continued on page 14

HAZARD COMMUNICATION... The Associated Landscape Contractors of America has obtained a copy of "Hazard Communication: A Program Guide for Federal Agencies" for members of the association. The guide is designed to provide technical assistance to agencies participating in the newly-implemented Hazard Communication Program. This document may be used by field managers to help determine those elements of the hazard communication program that are necessary to prepare their facilities for extension of the new standard. For more information, call ALCA at (703) 241-4004.

A LITTLE LOCAL SELF-HELP...Ilona Gray, executive director of the Alliance for Environmental Concerns in New Jersey, had some advice for the those starting a similar group in Pennsylvania. "You are probably the best spokespersons on your business," she told attendees of the Western Pennsylvania Turf Conference, but that voice should be unified. She noted there is a fear of pesticides, some real, some imagined. "You have to fight this with education." She also stressed the importance of local involvement to help against damaging state legislation and regulation.

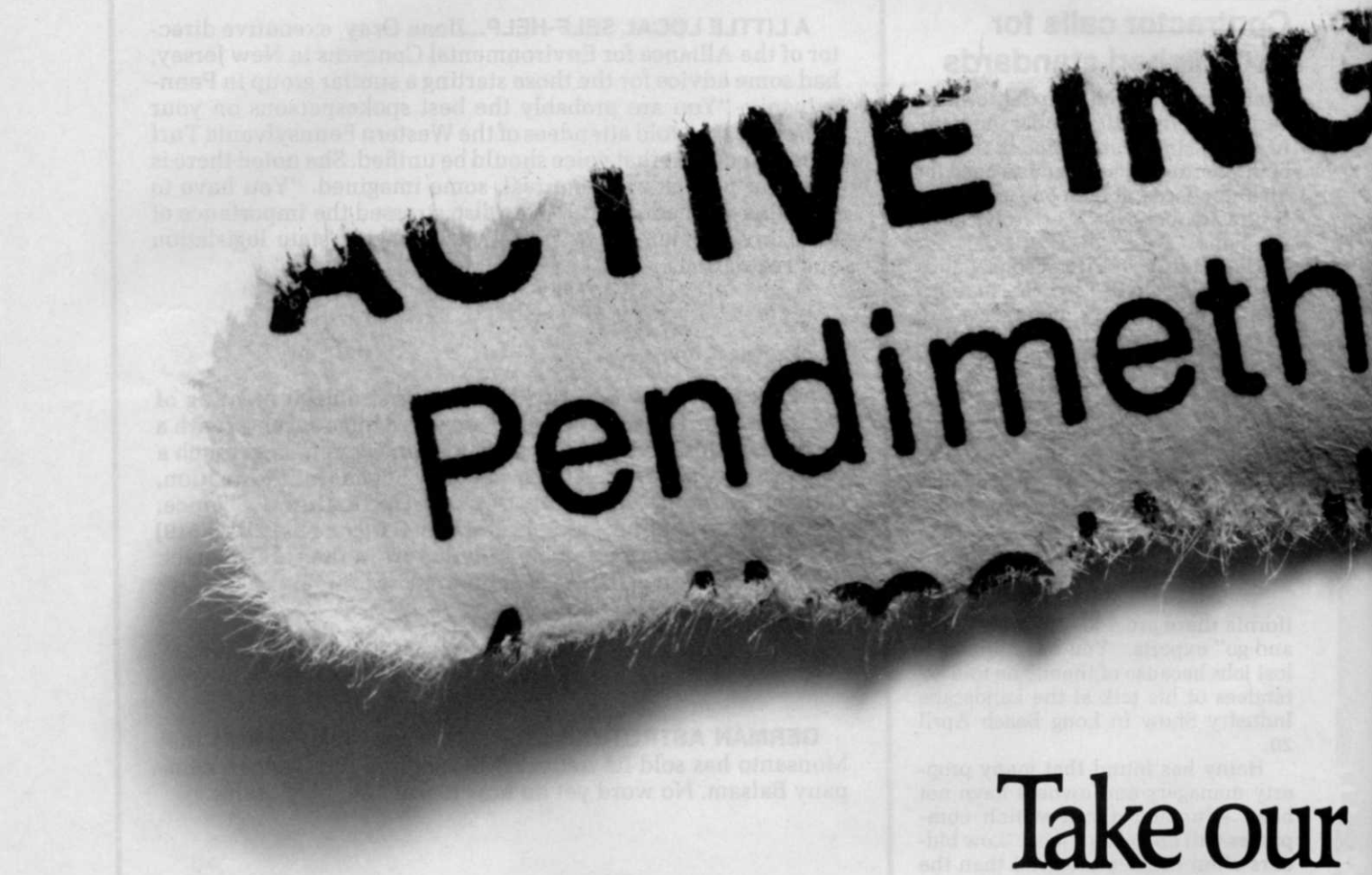
NEIGHBORS TO THE NORTH... The first official meeting of the Sports Turf Association-Canada was a huge success, with a turnout of close to 100. Athletic field management is as much a concern in Canada as it is in the U.S. For more information, contact: **Annette Anderson**, Dept. of Horticultural Science, University of Guelph, Guelph, Ontario, Canada N1G 2W1; (519) 824-4120. For information on athletic turf in the U.S., contact: Sports Turf Managers' Association, 400 Mountain Ave., Upland, CA 91786; (714) 981-9199.

GERMAN ASTROTURF... The *New York Times* reports that Monsanto has sold its Astroturf Division to the German company Balsam. No word yet on how it will affect U.S. sales.

AQUATIC WEED PROBLEMS?... The "1987 Aquatic Weed Control Guide", authored by **Vernon Vandiver**, Ph.D., gives aquatic site managers and applicators access to the following: aquatic weeds and herbicides registered for their use, labelled aquatic sites for specific herbicides, and herbicides, manufacturers, percent active ingredient by product. It is available through IFAS, University of Florida, Gainesville, FL 32611.

REMEMBER... Ovid the philosopher said: "When elephants fight, the grass suffers."

The most effective



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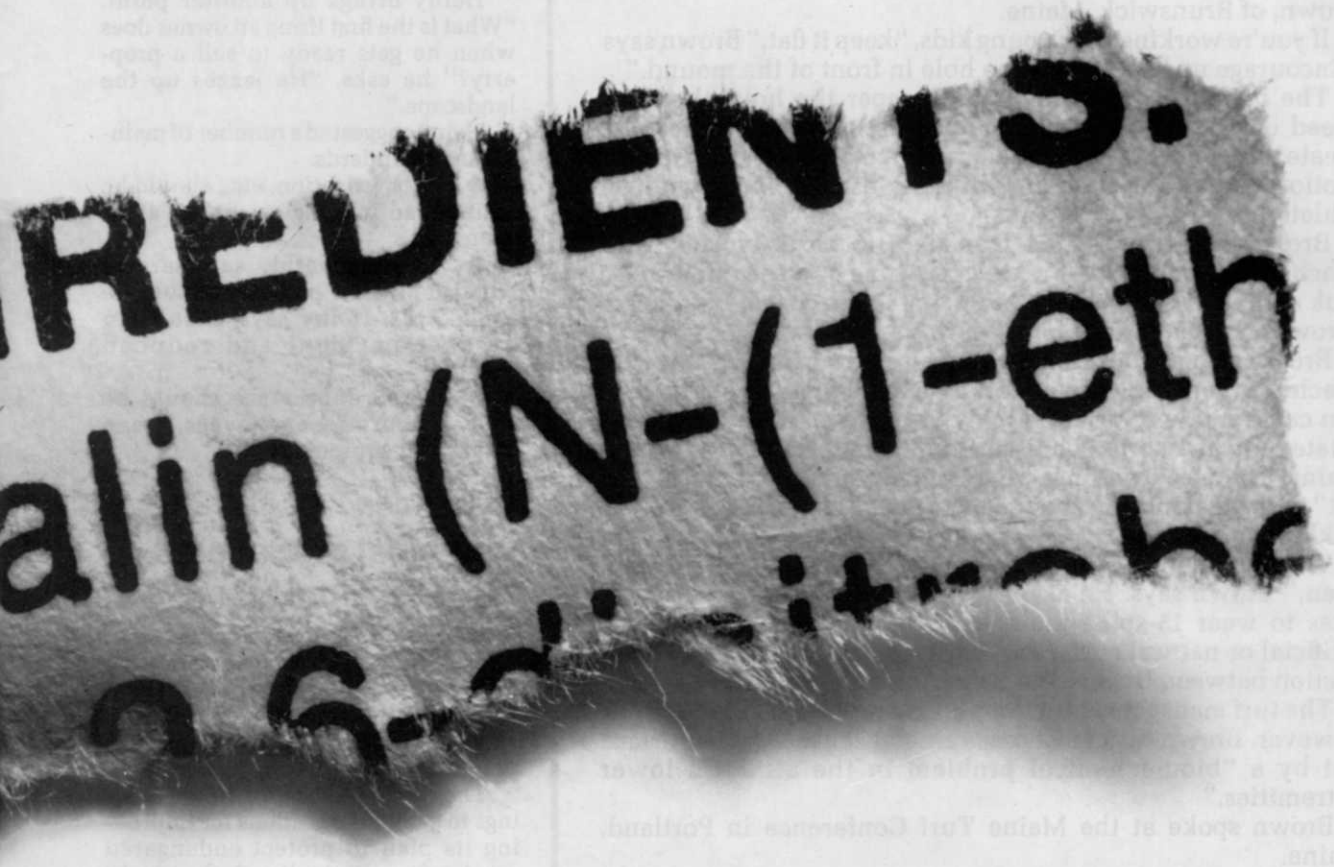
That's because pendimethalin from American Cyanamid is the active ingredient that offers season-long crabgrass control. And it does it very economically.

But pendimethalin controls more than just crabgrass. One low rate also prevents other tough grassy weeds including foxtail, fall panicum, barnyardgrass, and *Poa annua*. Hard-to-control broadleaf species like oxalis

crabgrass control.



word for it.

and spurge are also eliminated with the same rate.

What's more, pendimethalin breaks down into the environment. And it doesn't move laterally through the soil. Which means it won't seep into bodies of water or stop vegetation you don't want it to stop. Plus, pendimethalin-based herbicides don't have an offensive odor like some products.

So remember, when you select a herbicide with pendimethalin on the label, you have crabgrass control in the bag. And our word. Always read and follow label directions carefully.

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ATHLETIC TURF

Managing baseball, football fields

It's important for a school or park athletic field manager to know the age of people using a baseball field. The height of the pitcher's mound and the age of the athlete can make a difference in injuries, according to sports physical therapist Allan Brown, of Brunswick, Maine.

If you're working with young kids, "keep it flat," Brown says. "Encourage no kicking out the hole in front of the mound."

The higher the mound, or the deeper the hole, the more speed on the ball. But higher mounds or deeper holes also create a higher torque for the arm. Such a powerful thrusting motion can cause shoulder injuries, especially in younger athletes.

Brown encourages turf managers to work closely with coaches and trainers. "If a kid complains of a painful arm, go look at the mound," he says. "Suggest to the coach that the kid throws on a flat surface for a while."

Brown also encourages turf managers to work closely with coaches in repairing divots and holes on a football field which can cause ankle injuries. "Eighty-six percent of ankle sprains rotate outwards, often because of uneven terrain," Brown explains. The nerve endings in previously sprained ankles "forget" to stay balanced. When the foot comes down in a divot, the ankle will twist again.

"You can help as a turf professional by keeping the terrain even," Brown says. He also suggests that coaches advise athletes to wear 15-spike molded shoes whether they play on artificial or natural surfaces. That type of shoe distributes the friction between the leg and the surface.

The turf manager gets off easy on the problem of shin splints, however. Brown says most cases are not caused by the surface but by a "biomechanical problem in the athlete's lower extremities."

Brown spoke at the Maine Turf Conference in Portland, Maine.

Regional seminar in Illinois

The Sports Turf Managers Association (STMA) will hold a regional seminar at the College of DuPage in Glen Ellyn June 22. To receive further information or to register, contact Susan Glasgow at (312) 858-2800, ext. 2770.

Memberships available

Memberships are available in the STMA, which was formed in 1981. Cost for professional sports turf facility managers are $50 per year. Educators/parks/schools pay just $30 and students $10. Commercial affiliates may obtain a membership for $100. Checks should be sent to the STMA at 400 North Mountain Ave. Suite 301, Upland, CA 91786. For questions, call the STMA at (714) 981-9199.

CALIFORNIA *from page 11*

established standard."

Established standards will have benefits to owners and managers as well as contractors. They will lead to better looking projects, less complaints from tenants and less vandalism, Heiny notes. This in turn leads to lower replacement costs in the future.

Heiny brings up another point. "What is the first thing an owner does when he gets ready to sell a property?" he asks. "He jazzes up the landscape."

Heiny suggested a number of maintenance standards:

- Plants, irrigation, etc., should be maintained in a high standard at all times.
- A short monthly summary of work done on a property should be filed. This, Heiny says, results in quicker payment and reduced liability.
- Overall appearance should be good: uniformed employees, clean trucks and equipment.

LEGISLATION

Chemical producers blast EPA program

In testimony before representatives of the Environmental Protection Agency (EPA) in Washington, D.C., Warren Stickle called for changes in the agency's Endangered Species program.

The EPA is holding a series of hearings to gather suggestions for improving its plan to protect endangered species from agricultural chemicals. Stickle is executive director of the Chemical Producers and Distributors Association.

"Despite the merits of the Endangered Species Act, we seem to be pursuing a program of implementation that is out of proportion to the real needs of endangered species," Stickle told the EPA. "In many cases, it is like attempting to swat a fly sitting on a glass table with a 16-pound sledgehammer."

The Endangered Species Act would outlaw pesticide applications in certain areas of the country where endangered species live or visit.

Specific recommendations made by Stickle included updating habitat information, correcting county maps and establishing a training and certification for pesticide applicators. "Alternatives to the prohibition-of-use approach should be considered," said Stickle. "The unnecessary removal of pesticides creates an economic hardship without enhancing the goal of protecting species."

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COVER STORY

AERATION

Equipment improvements and greater awareness have aeration service penetrating deeper into the residential market.

by Jeff Sobul, associate editor

For a long time, aeration was something golf course superintendents did, and few others. There were, of course, some reasons for this.

Most of the aeration equipment was geared toward operating on larger areas such as fairways, or smooth areas such as greens. Up until a few years ago, no aerators were designed specifically for lawns.

Early experiments with machines such as the Ryan Ride-Aire found they really couldn't hold up to the constant pounding on grass areas that often had never been aerated before.

In addition, early machines for home lawns were expensive and weren't always reliable. Therefore, smaller contractors and lawn care companies which seem to have a lot of residential contracts couldn't afford the machines, which in turn made it difficult to offer the service.

Also, awareness of core aeration's benefits has only recently begun to spread as more research is conducted on the cultural practice, and as more golfers see the results on the course.

Shattering the core problem

Equipment manufacturers are finally addressing the problem of viable equipment shortages. Ryan led the way with its Lawnaire series and now, according to Milwaukee-area equipment distributor Ed Devinger of Reinders Brothers, smaller service companies have 12 to 15 machines to choose from.

While that isn't exactly a flood of machinery, improvements and competition have brought the price of a home lawn core aerifier down to about $1,000. "You paid $2,000 five years ago for a similar machine," Devinger notes.

Low prices and good results are making aeration a cost-effective service. "It's an increasing part of our business," says Bob DeRosa, DeRosa Landscaping in Montvale, N.J. "I think this is the way to go."

One obvious reason for DeRosa'a thinking is that the amount of aerifying his company has done in the last two years has grown by 50 percent. He sees no reason to slow it down. "In the Bergen County area, we're coming to realize aeration is the thing. It's a worthwhile service to sell." He believes his aeration contracts could increase by another 50 percent this year. He has about 40 clients now totalling three to four acres, but 80 clients is a reasonable goal.

DeRosa explains that Bergen County is about the second-most affluent county in the country, home to the headquarters of a number of large corporations. In his neck of the woods, houses *start* at $250,000. Of course, with a house like that, a good lawn is a necessity. ("When we have a downturn in the economy, we don't feel it too much," he relates.) In addition, the potential for commercial contracts is excellent.

Propagating nationally

DeRosa's is not an isolated case. "Since people are becoming more attuned to its benefits, it has increased," says Bill Davids of Clarence Davids & Sons, Blue Island, Ill. The 38-year-old company has offered the service for at least the last 25 years, he says. The service has grown by 10 percent since 1986.

Prograss Liquidcare Lawn Service of Hubbard, Ore., began offering the service three years ago, according to manager Paul Bizon. "Some accounts were asking for it," he explains. They had heard about it through gardening

Smaller equipment built specifically for home lawns has fueled the growth of core aeration service as a money-maker in the residential market.

articles or had seen its effects on the golf course.

"It was a natural thing for our program," Bizon continues. About 10 percent of the company's customers have the service. Bizon expects that total to grow by another 12-15 percent this year.

Marketing efforts have gone a long way toward building the service. Companies only recently began to market the service. Clarence Davids & Sons offers the service as an extra to its regular management package. They sell the service with with a brief description and some help from pamphlets by Ryan.

Bill Davids says the price for the service is based on the size of the job (more or less than an acre) and the estimated time per hour for the job.

DeRosa now sells the service as part of the whole package as opposed to an extra. He explains that commercial aeration holds the biggest growth potential for his company because of the direction it is taking. "But there is potential for residential aeration contracts," he adds.

Bob Berry of Lancaster Landscapes, Arlington, Va., has a similar forecast. Eighty percent of his company's contracts are large commercial/residential ones—housing or condominium developments. He has seen about 50 percent growth of the service in the last two to three years. Because of the size of his company, the residential market is not cost-effective for him, but "it has tremendous potential," he adds quickly. "In the metro Washington D.C.-area there's a need for people in this field.

"No question. I think someone coming into this area offering aeration as a service would do very well," he says.

A few more obstacles

Though home lawn areation equipment has improved greatly during the second half of this decade, it still isn't perfect. "None of them take enough cores out," says Prograss's Bizon. Having to go over a lawn in two or three directions is not cost-effective, either. "You can't afford to take a lot of time on it," he adds.

"I can understand the manufacturers' problems," Bizon empathizes. "They have to make a machine small enough to fit through a gate and fast enough to get the job done to make it worthwhile."

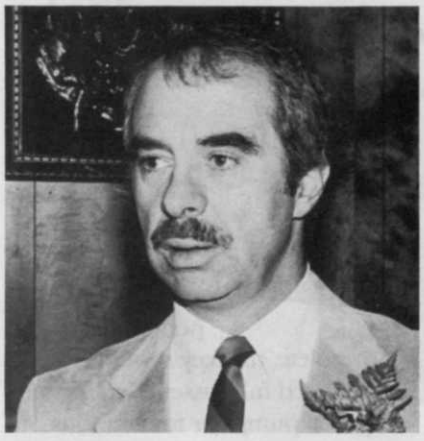
This challenge lays before the equipment manufacturers for this year and into the '90s. Given the rapid strides they have made in the last few years, it is not unreal to believe they can make the improvements. **LM**

'In the metro Washington D.C.-area, there's a need for people in this field.'

—Bob Berry

'Since people are becoming more attuned to its benefits, it has increased.'

—Bill Davids



'In Bergen County, we're coming to realize aeration is the thing.'

—Bob DeRosa

'Aeration has become more cost-effective for smaller companies.'

—Ed Devinger

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Circle No. 105 on Reader Inquiry Card

WARM-SEASON TURF DISEASES

It can be very difficult to tell one turf disease from another. But proper identification is a necessity before treating with a fungicide.

by Robert Haygood, Ph.D. and Walker Miller, Ph.D.

What is causing the dead areas in turf? is a frequent question landscape professionals must address. It is also one of the most difficult questions to completely and accurately answer because of the many potential factors involved.

Diseases, insects, environmental stress and improper cultural practices are frequent causes.

Fungi, viruses and nematodes can cause serious problems on all warm-season turf species. Environments that favor disease can result in devastated swards virtually overnight. Knowing causal agents, environments favorable for infection and spread, and susceptibility of turf species makes diagnosis more accurate.

Adopting good horticultural practices helps avoid predisposition to disease. Even the healthiest turf often needs pesticide applications to protect it from pathogenic microorganisms. The target pest must be identified so an effective pesticide can be selected. For example, several fungicides are effective for brown patch, but not for pythium blight.

Here are some new developments in disease diagnosis and control for warm-season areas of the country:

Fairy rings are irregular sized circular or semi-circular bands of lush green turf.

Brown patch

Rhizoctonia species can cause circular patches and/or leaf spots on many turfgrass species, depending on fungal species and micro-environment. Brown patch, the single name for all diseases caused by Rhizoctonia species, occurs frequently on all warm-season grasses.

continued on page 22

The subgroup of *Rhizoctonia solani* that rots the sheaths and stolons of St. Augustinegrass can attack centipedegrass in the same manner.

DISEASES *from page 21*

Rhizoctonia solani is the most frequent disease of warm-season turf. This fungus generally causes circular patches under warm, moist conditions. St. Augustinegrass and zoysiagrass have traditionally been considered more susceptible than centipedegrass or Bermudagrass. Research at Clemson University notes that brown patch is a more serious problem on centipedegrass than previously recognized.

Rhizoctonia solani is composed of several identifiable sub-groups. The same subgroup that rots the sheaths of St. Augustinegrass can attack centipedegrass in the same manner. The most characteristic symptom of brown patch is the presence of soft and subsequently necrotic basal sheaths.

Sheath rot caused by *R. solani* is most severe when temperatures are 75°F to 85°F in moist conditions. Temperatures favorable for activity of *R. cerealis*, range from 55°F to 70°F.

Rhizoctonia oryzae and *R. zeae* are referred to as hot weather species since they can attack turf when temperatures are as high as 92 °F. These two species have the capability of causing sheath rot of centipedegrass and St. Augustinegrass.

Brown patch can occur any time of year. In South Carolina and areas with similar climates, brown patch is often most severe on warm-season turfs in the spring and fall. This is especially true on centipedegrass and St. Augustinegrass.

Occurrence of brown patch can be reduced by adopting good horticultural practices. Excessive fertilizer application and thatch accumulation favor disease development. Watering late in the afternoon or at night should be avoided. Fungicides effective for brown patch control are noted in Table 1.

St. Augustine decline

A strain of panicum mosaic virus (PMV), known as St. Augustine decline (SAD), causes light green to yellow spots and blotches on leaf blades of St. Augustinegrass. Infected turf is stunted, declines and often dies within three years. The disease has been reported in Texas, Arkansas, Louisiana, Mississippi and South Carolina.

A strain of PMV can affect centipedegrass. It causes foliar symptoms similar to those on St. Augustinegrass.Research is being done at Clemson University to characterize the disease.

No chemicals are available for control of SAD or other virus diseases.

Floratam, Seville and Raleigh are varieties of St. Augustinegrass which have proven to be resistant to strains of PMV detected thus far. These varieties or a non-susceptible turfgrass species should be selected where SAD has caused problems in the past. Chinch bug resistance, cold hardiness, shade tolerance and other factors of concern should be integrated into the selection process.

Spring dead spot

SDS occurs as circular dead areas of Bermudagrass from six inches to several feet in diameter. The spots show up as the grass greens up in the sring. Roots and stolons in affected spots are dark and rotted. During summer, the spots gradually recover from stolons running in from the outside. Weeds are a problem while spots are recovering. Despite good management, spots still appear as weak areas in the turf. In the fall, spots can be observed in tall mowed Bermuda as shorter growing areas that remain green longer than other areas. In close mowed Bermuda, there are no symptoms.

If you have had problems with SDS in the past you may well continue to have problems. Generally the spots re-occur in the same spot each year, gradually getting larger, coalescing into irregular areas.

Another good indicator is your location. If you are anywhere from the northern limit of where Bermudagrass is grown to where the average daily temperature for November is 55 °F, SDS is likely. In South Carolina, the disease commonly occurs north of a line that runs from the North Carolina border through Sumpter, S.C. and Augusta, Ga. The frequency is low south and east of that line.

Recent research has discovered that *Leptosphaeria korrae* causes the disease in the U.S. This is a breakthrough in SDS research. It will greatly facilitate further improvements in control and management.

Previously, only certain states had special labeling for fungicides for SDS control covering benomyl and PCNB. Two new products are now labeled for SDS, Rubigan and Banner, though the Banner label is limited to California use only.

Dollar spot

The symptoms of dollar spot (*Sclerotinia homeocarpa*) vary, depending on mowing height. In closely mowed bentgrass and Bermudagrass, one- to three-inch straw-colored spots occur. On tall or coarse grasses like zoysia and fescue, it could be confused with brown patch except for leaf lesions which are diagnostic. Straw-colored lesions move in from the leaf margin resulting in distinct bands across the leaf. Once the band is completely across the leaf, the distal portion of the leaf collapses. The disease occurs mostly in the mild temperatures of spring and fall in South Carolina. Signs, actual mycelium of the fungus, are often visible before the dew dries in the early morning. Do not confuse these signs with Pythium, since choice of fungicides is vastly different.

The turf should be managed to avoid nitrogen deficiency. Excess nitrogen can contribute to developing brown patch and other turf problems. The irrigation schedule should avoid prolonging the leaf wetness period.

Thatch management is another important aspect of the dollar spot control program. High thatch levels contribute to disease. Some excellent fungicides for dollar spot control are noted in Table 1.

Melting out

Melting out (Bipolaris and Drechslera species) is sometimes known by the old name of the fungus genus which causes the disease, Helminthosporium. Melting out is a complex of many different species. Each species is favored by different environmental conditions and is more prevalent on one host than another.

The disease is very destructive during wet humid weather. Melting out can be a real problem on Bermuda and zoysiagrass but occurs on bentgrass, fescue and ryegrass in the Southeast.

Small dark brown, purplish or purplish-red spots appear on the leaf blades or sheaths in the spring. If conditions favorable for disease persist, the leaf spot phase can result in coalescing lesions, blighted leaf blades and above-ground portion of the plant.

The melting out phase appears in warm to hot weather as a reddish brown decay of the crown, stolon, rhizome and root tissues. These turn chocolate-brown to black as they are invaded by other fungi and bacteria. The feeding roots of such plants are shallow and few. The turf can wilt in midday even with adequate moisture.

Cultural tactics include proper mowing height, collecting clippings in intensively-managed turf, avoiding dense thatch, maintaining a balanced fertility program, watering adequately, improving soil drainage and promoting good drying conditions. If cultural practices are not adequate, then fungicides may be needed on a preventive basis.

If a few applications of fungicide are going to be applied, they are best applied in the spring to prevent the disease's build-up. Once the disease builds to epidemic proportions, it is very difficult to bring it

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Table 1.

TURFGRASS DISEASE CONTROL.

Read and follow label directions closely

Fungicide*	Product Rate/1,000 sq ft	Fungicide*	Product Rate/1,000 sq ft
Brown Patch			
anilazine 50WP	4-8 oz	iprodione 50WP	1.5-2 oz
benomyl 50WP	2 oz	maneb 80WP	3-8 oz
chlorothalonil 75WP	2-8 oz	mancozeb 37%	5-14 fl oz
chlorothalonil 29.6%	8-12 fl oz	mancozeb 80WP	4 oz
chlorothalonil 40.4%	3-11 fl oz	PCNB 75WP	3-16 oz
triademefon 25WP	1-2 oz	10G	2-7.5 lb
propiconazole	1-2 fl oz	thiophanate 50WP	1-2 oz
fenarimol 50WP	.4-.8 oz	thiophante-methyl 50WP	2 oz
Dollar Spot			
anilazine 50WP	4-8 oz	fenarimol 50WP	.2-.4 oz
benomyl 50WP	1 oz	iprodione 50WP	1.5-2 oz
chlorothalonil 75WP	2-8 oz	maneb 80WP	6-8 oz
chlorothalonil 29.6%	8-12 fl oz	mancozeb 37%	10-14 fl oz
chlorothalonil 40.4%	3-11 fl oz	mancozeb 80WP	6-8 oz
triadimefon 25WP	1-2 oz	thiophanate 50WP	1-2 oz
vinclozolin 50WP	2 oz	thiophanate-methyl 50WP	1-2 oz
Melting out, Helminthosporium Leaf Spot			
anilazine 50WP	4-6 oz	iprodione 50WP	1.5-2 oz
chlorothalonil 75WP	2-8 oz	maneb 80WP	3-8 oz
chlorothalonil 29.6%	8-12 fl oz	mancozeb 80WP	4 oz
chlorothalonil 40.4%	3-11 fl oz	mancozeb 37%	5-14 fl oz
Pythium Blight			
chloroneb 65WP	4 oz	metalaxyl 2E	1-2 fl oz
etridiazole 30WP	2-8 oz	propamocarb 6E	1.33-4 fl oz
Rust			
anilazine 50WP	4-8 oz	maneb 80WP	3-8 oz
propiconazole	1-2 fl oz	mancoxeb 37%	5-7 fl oz
triadimefon 25WP	1-2 oz	mancozeb 80WP	4 oz
Fairy Ring			
Vapam *see label for detailed instructions*			
Powdery Mildew			
triadimefon 25WP	1-2 oz	propiconazole	1-2 fl oz
Gray Leaf Spot			
chlorothalonil 75WP	2-8 oz		
chlorothalonil 29.6%	8-12 fl oz		
chlorothalonil 40.4%	3-11 fl oz		
Slime Mold			
None recommended. Easily controlled by cultural methods.			
Spring Dead Spot			
fenarimol 50w	1-2 oz	propiconazole (calif only)	1-2 fl oz
St. Augustine Downy Mildew			
metalaxyl	see label		
Anthracnose			
propiconazole	1-2 oz	trindimefon 25WP	2 oz

*Current recommendations of Clemson University Cooperative Extension Service. The mention of a product is not an endorsement, and discrimination by the Clemson University Cooperative Extension Service is not implied by the exclusion of any comparable product.
Each specific label is the final authority on application rates and uses.

back under control. Once this situation develops, the turf manager will need to fertilize to promote growth, and frequent applications of fungicides will be necessary at five- to seven-day intervals. Thorough coverage is an important aspect of melting out control.

Pythium blight

Pythium blight is caused by species of the fungus Pythium. It is especially severe on overseeded ryegrass and during establishment of other cool-season grasses in the Southeast. During warm wet weather, outbreaks of disease may result in complete destruction of stands within 24 hours from the first evidence of symptoms.

The disease appears as small irregularly-shaped spots 1/2 to 4 inches or so in diameter. At first they are water-soaked in appearance, fading to light brown as they dry out. Individual diseased leaves are at first watersoaked, soft, even slimy. When stepped on, they mat together. After a period of dew and while the humidity is still high, white "cobwebby"-like growth may be visible.

This fungus lives during dry periods as a soil inhabitant. High levels of nitrogen fertility and low levels of calcium favor disease. High pH (above 7) also favors disease. The use of benzimidazole fungicides can increase the disease's severity. Adequate calcium levels should be maintained and alkaline pHs avoided. When conditions favor disease, fungicide sprays are required. Seed treated with an effective fungicide such as Apron or Koban per label directions will help prevent the disease during establishment.

Gray leaf spot

The fungus *Pyricularia grisea* causes round to oblong leaf spots on St. Augustinegrass that are brown, tan or ash-colored in the center with purple or reddish-brown margins. Severely-affected turfgrass may have a scorched appearance.

Avoid excessive nitrogen and conditions that would extend dews during the warm part of the year. This disease occurs during warm, rainy periods in the summer. In intensively-managed situations, a fungicide may be necessary.

Rusts

Different rusts attack different turfgrass species. Most are in the genus Puccinia, but there is a different species for each type of grass—and sometimes for each variety of grass.

Seldom are rust infections severe enough to cause serious damage. Meyer and Emerald zoysias and some ryegrasses are the most likely to be affected severely enough to warrant spraying. Available fungicides are listed in Table 1. Several of the newer fungicides in the ergosterol inhibiting group are super-effective.

Cultural control consists of fertilizing to stimulate growth, mowing frequently and catching clippings to reduce inoculum. Ryegrasses resistant to rust should be selected.

Anthracnose and curvullaria

Using cool-season grasses in the Southeast for intensively managed turf such as

bentgrass greens has resulted in problems with anthracnose (*Collectotrichum gramicola*). It occurs during the peak of hot weather when cool-season grasses are barely growing. Under this situation the organism has time enough to build up to damaging levels. Normally any infections that take place are mown away.

Cooling the turf with sprinkling will set the grass up for other diseases. The only recourse is to spray when disease pressure is high. The new product, Banner, an ergosterol inhibitor, is labeled for control, but it may not be used on home lawns. It has systemic properties which should mean less spraying.

Curvullaria is another weak pathogen that is widespread in the Southeast. On turf under extreme environmental stress during hot weather, the fungus can contribute to decline. Under such conditions, protective fungicides appear to help.

St. Augustine downy mildew

This disease is limited to the southern extremes of the U.S. It is characterized by white raised linear streaks in the leaf blade. The disease is apparently severe in poorly drained areas. The fungicide metalaxyl (Subdue) is labeled for control.

Powdery mildew

Rarely is this disease a serious problem. The fungus *Erysiphe graminis* is seen as white powdery growth over the surface of leaf blades. In the Southeast, it has been observed on Bermuda, bluegrass and fescue in the summer. Powdery mildew is a dry-weather disease. It does not require free water for infection. Several fungicides in Table 1 will give very good control.

Table 2.

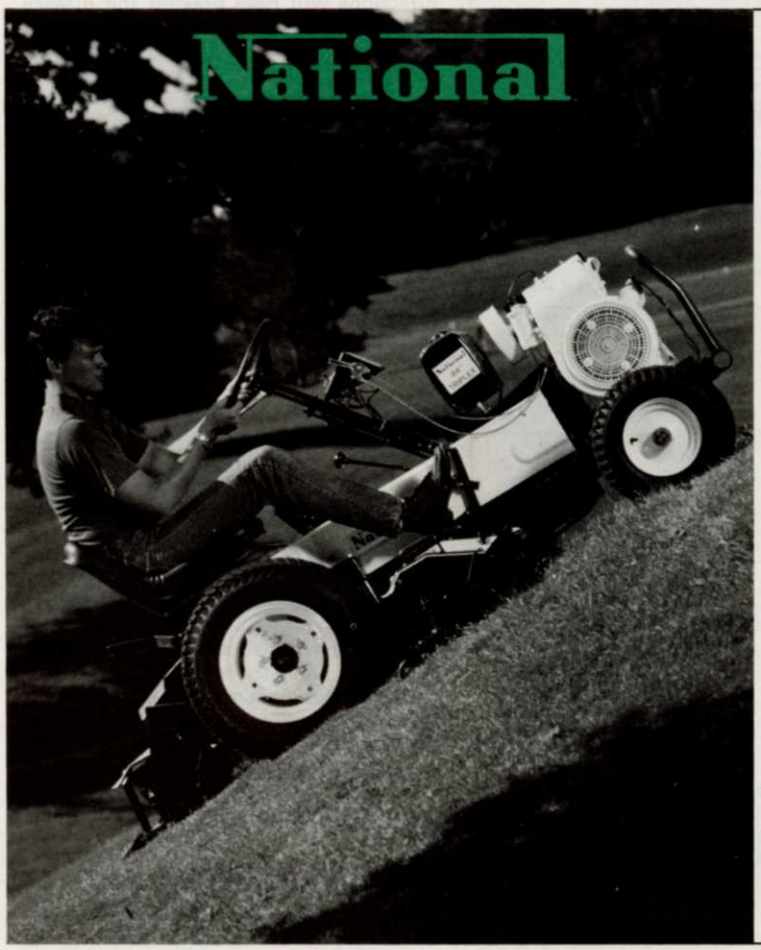
TRADE NAMES FOR THE COMMON TURF FUNGICIDES

Common Name	Trade Name*
anilazine	Dyrene
benomyl	Tersan 1991, Benlate
chloroneb	Terraneb SP
chlorothalonil	Daconil 2787
etridiazole	Koban, Terrazole
fenarimol	Rubigan
iprodione	Chipco 26019
maneb	Dithane M-22 Special
mancozeb	Fore, Tersan LSR, Dithane M-45, Manzate 200 Flowable, Penncozeb
metalaxyl	Subdue
PCNB	Terraclor, Turfcide
propiconazole	Banner
propamocarb	Banol
thiophanate	Cleary's 3336
thiophanate-methyl	Fungo 50
triadimefon	Bayleton
vinclozolin	Vorlan

*The mention of a product does not constitute a recommendation or an endorsement, and discrimination by the Clemson University Cooperative Extension Service is not implied by the exclusion of any comparable product. Each specific label is the final authority on application rates and uses.

Fairy rings

Irregular-sized circular to semi-circular bands of lush green turf often occur. Turf on either side of the infected area may thin and decline. The rings can persist for years, increasing in size annually. **LM**



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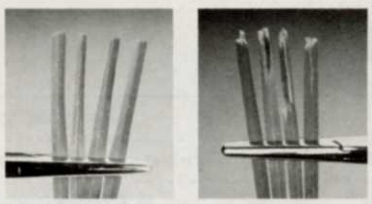

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Handle your grub situation fast, before things get really ugly.

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Fairy rings are caused by soil-inhabiting fungi which commonly produce mushrooms. They decompose organic matter and either stimulate, cause death of or compete with grass for water and other resources.

Fairy rings are difficult to control and are very common. Tactics include water-soaking the area with a hydro gun regularly; fertilizing to mask the symptom of the dark ring; using herbicides to prevent weed invasion till the grass can recover; completely removing the infested area; and fumigation followed by replanting. In most situations, applying fertilizers and herbicides as an integrated practice is considered most practical.

Slime molds

Bluish-gray encrustations on leaf blades are most common. Some slime molds look like vomit or creatures from outer space. Hence they can cause a lot of excitement.

They, however, are not pathogens. The only problem they could cause would be creating too much shade for the leaf blades. They are a biological indicator of persistent dews and hence a warning that disease problems could develop. They do not warrant a control program. Many fungicides applied for other reasons will inhibit their development.

Nematodes

Parasitic nematodes are microscopic worms that attack the root system. Injured, poorly developed roots result. Affected turf tends to wilt easily, responds poorly to fertilizer, and appears thin or declining.

If nematodes are suspected, soil should be analyzed. Take 10 to 20 soil subsamples about six inches deep with a soil probe. Mix them together in a plastic bag. Protect the sample from extremes in temperature and rough treatment. Deliver this bag to your local extension service or private laboratory for analysis and interpretation. Be sure to tell them what the grass host is or will be.

If nematodes are the problem, your options are limited. Adapting the best cultural practices available will enable the turf species to better withstand injury from high nematode populations. Mocap, Nemacur and Dasanit are labeled under certain situations, as noted in Table 3. Check with your cooperative extension service to see what chemicals are effective for the nematode of concern.

A new product has just hit the market for nematode control. It is called Clandosan. At this point, we do not know enough about this product to recommend it in South Carolina. If you use it, we suggest you monitor your results by sampling regularly from both a treated area and non-treated area. This material contains nitrogen, so be careful not to confuse a nitrogen response as control. Actually, your non-treated area should receive the same amount of nitrogen as in the Clandosan-treated area. **LM**

Table 3.

NEMATODE CONTROL IN TURF

Crop	Nematicide	Rate/1,000 sq ft
Commercial turf only, except Mocap 10G which is also labeled for use on residential furt by commercial pesticide applicators.	R Dasanit 15G R Mocap 10G R Nemacur 10G	1 ½-3 lb 5-7 lb 2 ⅓-4 ⅔ lb

REMARKS: For use only by certified commercial applicators. Commercial turf includes golf courses, cemeteries, sod farms, and industrial grounds. Follow manufacturer's directions carefully! R-Some or all uses of this product are restricted.

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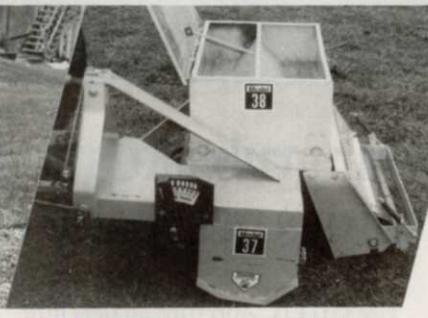
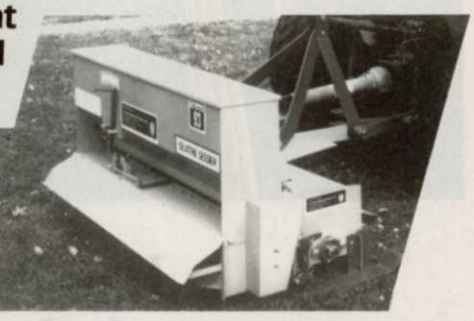


MODEL 37/38 for tractors in 16-25 hp range, bare dirt capabilities with dual feed hopper.



MODEL 83/93— 4' PTO model for tractors 25 hp and up. In 1962, Buck Rogers built the first Rogers Slit Seeder. Now, in 1988, he has improved and expanded on his original ideas under the Olathe trademark. With 25 years experience, the Olathe people know about slit seeding. Compare features and price. You'll choose Olathe.

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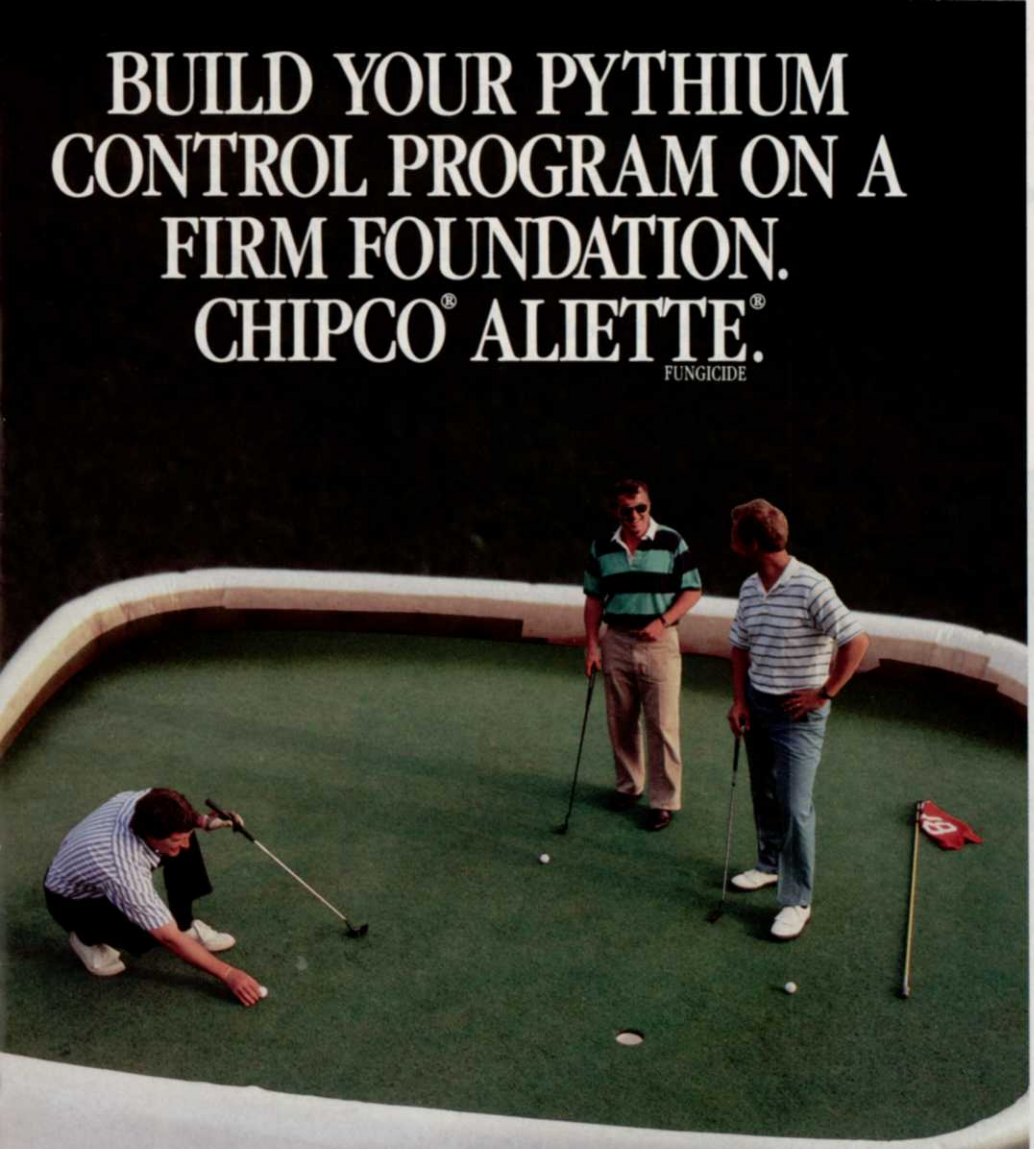

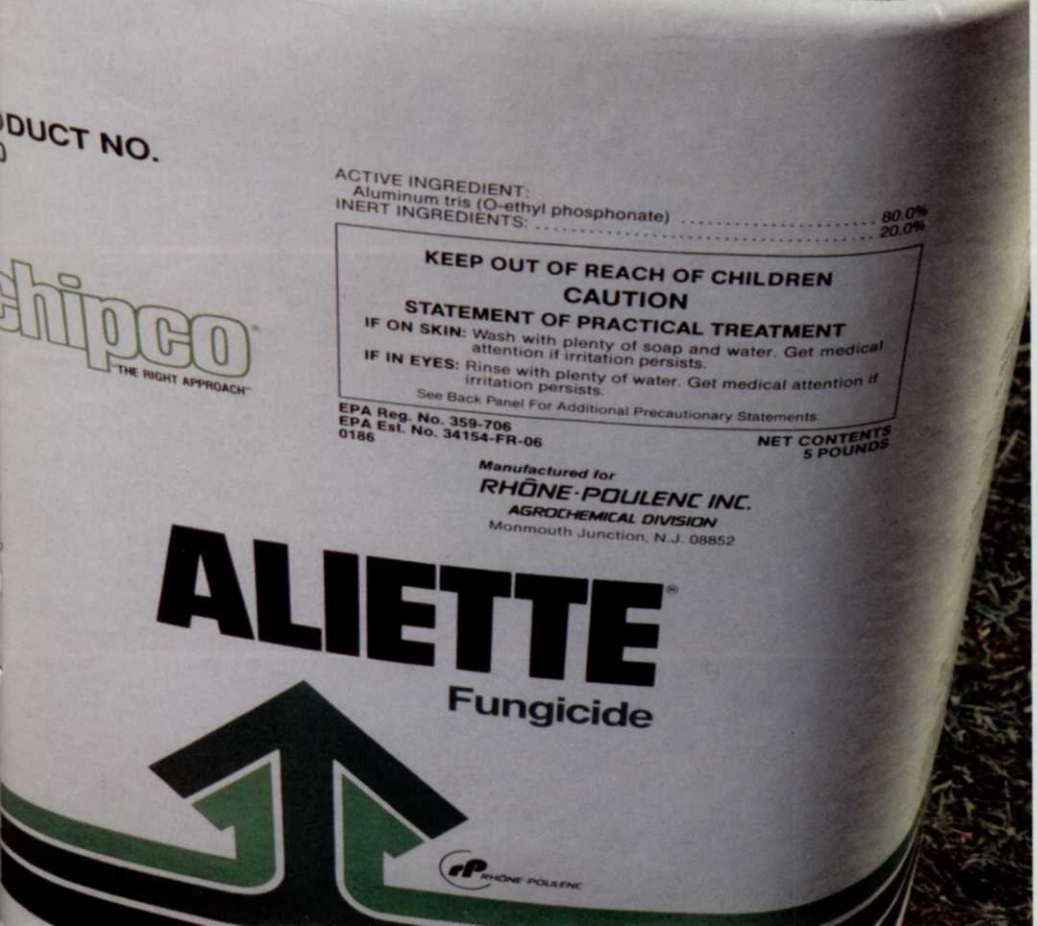
DUCT NO.
ACTIVE INGREDIENT:
Aluminum tris (O-ethyl phosphonate) 80.0%
INERT INGREDIENTS: 20.0%
KEEP OUT OF REACH OF CHILDREN
CAUTION
STATEMENT OF PRACTICAL TREATMENT
IF ON SKIN: Wash with plenty of soap and water. Get medical attention if irritation persists.
IF IN EYES: Rinse with plenty of water. Get medical attention if irritation persists.
See Back Panel For Additional Precautionary Statements.
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Sonar handles weed-choked water.

Sonar is an aquatic herbicide breakthrough. It controls many of your problem water weeds without worry. And it handles them all season long. No going back for a second or third treatment. Sonar does it right the first time.

Sonar won't restrict you like other aquatic herbicides.

When used properly, the Sonar label does not restrict swimming, fishing or drinking. So there is no need to stop using your water after treating with Sonar.

Apply Sonar whenever...

...weeds are a problem. In the spring,

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Apply Sonar wherever...
...water weeds grow. Golf course ponds. Canals. Private lakes. Even large recreation lakes. Sonar is ready to go to work.

Apply Sonar to water-spoiling weeds. Knock them out of commission. All season long. And claim back your water rights with the breakthrough aquatic herbicide that delivers full-season, broad-spectrum weed control. Sonar. See your Elanco distributor. Or call toll-free: **1-800-352-6776.**

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Circle No. 118 on Reader Inquiry Card

LEGISLATION AND AQUATIC WEED CONTROL

Just because it's been delayed doesn't mean that the Endangered Species Act—and others—won't have an eventual effect on the aquatic site manager who applies chemicals.

by John E. Gallagher

Current legislative activity that may affect the business of aquatic weed control personnel is associated with public concern. How?

For many years, environmental activists have made the general public aware of the many "insults to the environment" associated with the use and misuse of pesticides. Now instead of speaking individually, the separate environmental groups have merged into a coalition that speaks with a loud voice. Our politicians recognize this. So the potential for far greater regulations and restrictions on the use of pesticides (aquatic herbicides are pesticides) has now become reality.

We live and work in a social climate where pesticide use remains synonymous with "poison"—a concept not without justification, considering our past mistakes. Your personal and business philosophies must take this organized public concern into consideration in your future operations.

John E. Gallagher is a graduate of Penn State University. He spent 20 years as aquatic weed control specialist with various companies. He is now retired.

The CAST 2,4-D report

Concerted action can also work for the pesticide industry. The combined voices of the weed science societies, the growth regulator society and the aquatic plant management society worked recently. All speaking in defense of

Aquatic site managers who apply pesticides should know about some important legislation coming down the pike.

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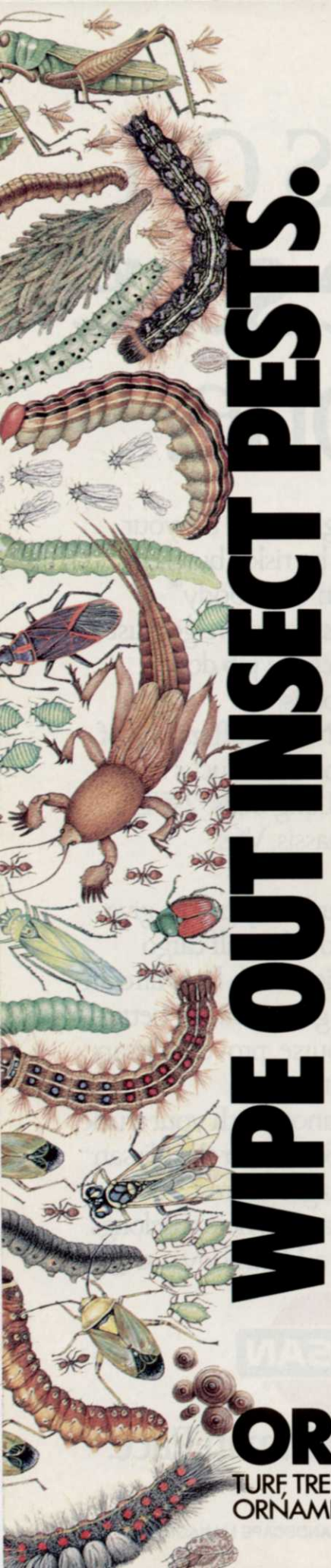
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Here's broad spectrum protection that can put a whole lineup of insects completely out of the picture: New ORTHENE Turf, Tree & Ornamental Spray.
Cleared for use on a long list of trees and plants, ORTHENE is also cleared for turf insects – including mole crickets in Florida. With ORTHENE, one spray kills pests like tent caterpillars, whiteflies, Japanese beetles and thrips on contact. Also, use ORTHENE for lasting residual action against other insects from aphids to sod webworms.
ORTHENE kills both on contact and by systemic action. It makes the whole job of protecting lawns, golf course turf, trees, shrubs and flowers simpler, more convenient and more effective. Give yourself the edge against insects. Control them with ORTHENE Turf, Tree & Ornamental Spray.
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2,4-D, the organizations were able to pursuade CAST (Council for Agricultural Science and Technology) to form a task force to do a critique and summary of the "Kansas Farm Worker Study" and other epidemiological studies on 2,4-D and cancer among farmers.

A report "Perspectives on the Safety of 2,4-D" was produced and is available from CAST at a price of $2.

The task force summary concluded that, "2,4-D—as it is generally used—does not represent a significant health threat." It did, however, recommend that "users should apply it with care and respect required of every chemical that can cause harmful effects at high doses." This report should be read and carried by any applicator applying 2,4-D for aquatic weed control.

The Endangered Species Act

Again, concerted efforts on the part of many individuals and state agencies, helped the EPA decide to delay implementation of the Endangered Species Act. The act and associated product label modifications required of pesticide registrants do not take effect until Sept. 15, 1988.

The Endangered Species Act is a federal law administered by two agencies of the U.S. Department of the Interior: the Office of Endangered Species of the U.S. Fish and Wildlife Service and the Office of Protected Species of

There is a feeling that a single federal law will either under-restrict or over-restrict.

the National Maritime Fisheries Service. EPA becomes involved (and subsequently the pesticide industry) since EPA is responsible for registration and labelling of pesticide products including aquatic weed control herbicides.

The basic premise of the act is "a prohibition on the use of pesticides in the range of endangered or threatened species or their habitat."

Section 7(a)2 of the act requires that all federal agencies (including the EPA) conform to the above requirement. The EPA notified manufacturers, formulators and registrants of pesticides of a label reform program which would put it in compliance with the law. This statement was to appear on product labels or on supplemental labelling which must be distributed at the time of sale.

Endangered Species restrictions

The following notice arrived on the desk of company representatives in May of 1987, with a compliance date of Feb. 1, 1988: "Before using this product (specific cluster) in a county listed below, you must contact the endangered species specialist in the regional/field office of the U.S. Fish and Wildlife Service. You must provide FWS with your name and phone number, the products you intend to use and the specific location in which you intend to use it. The F&W Service will inform you whether your proposed use is in the range of endangered species. Use of this product in the range of endangered species as defined for you by the F&W Service is prohibited."

Industry began to implement the proposed label changes. The problems of a lack of accurate county species habitat maps and an incomplete list of clusters (pesticides with common use patterns) led to the confusion that began the concerted action among pesticide users.

The ESA implementation has been delayed, but once the needed accurate county habitat maps are produced and other necessary compromises have been made, the

←Circle No. 108 on Reader Inquiry Card

ESA will, I believe, become an enforceable reality. You, as the ultimate product user, will have to continue to abide by the restrictions on the label.

Groundwater legislation

A very critical legislative battle is under way. It will also affect the daily working operations of the aquatic weed control applicator.

The Durenberger-Leahy S.B. 1419 has as its major premise a requirement that all groundwater come under the regulations that govern drinking water contamination.

The pesticide industry as a whole favors H.R. 2463 which defines potable water—current or potential—on the basis of common sense criteria such as depth, hydrology and water quality. The opposition, environmental groups in support of S.B. 1419, argue that all water must be pure and that the concept of uncontaminated groundwater is a basic property right.

The groundwater issue is much too complex to do more here than to alert you that it, too, is very real. Within a relatively short time, legislation of some sort will be passed.

One final note about groundwater legislation: EPA is encouraging the states to take over. But there is a feeling that a single federal law will either under-restrict or over-restrict.

To get a feel for what can happen, read published information on California's Proposition 65 now in force. Proposition 65 states, "No person in the course of doing business shall knowingly and intentionally expose any individual to a chemical known to cause cancer or reproductive activity." The law includes a provision concerning the discharge of chemicals into drinking water. Iowa and Arizona have passed their own safe drinking water acts and it is expected that more will do the same.

This paints a somewhat dreary picture for the commercial aquatic herbicide applicator. But, as indicated earlier, concerted effort on the part of you and your societies can control some of the unrealistic over-regulation that is being proposed. To paraphrase an old movie, you should "support your local Congressman" to let him know how you feel about these proposed legislative actions and why you feel as you do. You also are concerned about environment pollution. For the industry as a whole, hope for reasonable regulations is totally dependent on cooperative dialogue with concerned environmental groups. It can work.

Consider, for example, the comments made by Richard K. Long, director of corporate communications at Dow Chemical, as reported in the March 14 *Chemical and Engineering News*, on the editor's page:

'The image of chemicals'

"I am glad to talk about public fears of chemicals and technology. Recent publicity shows that not nearly enough is being done to address public concern.

"News media aren't perfect, nor has the chemical industry always been helpful—reporters have seen 'charm school' treatment, wasted threats of legal action and other stonewalling tactics by public relations people. Net result? Prickly reporters, angry industry officials, an often confused public and mostly negative news coverage of chemicals and chemistry.

"Six major environmental laws were enacted in Washington. This suggests that the pro-environmental lobbying was more effective than the industry's effort.

"Experience says that if an industry wants to win, it must be seen as part of the solution, not the problem. Instead of saying 'There's no problem,' we must say with conviction, 'We'll fix it.'" **LM**

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Whatever sort of grounds you manage professionally, ORTHO's DIQUAT Herbicide H/A can help you keep them clean and trim. With its fast-acting formula, DIQUAT gives rapid burn-down, usually within 24-48 hours, of a wide variety of annual grasses and broadleaf weeds. DIQUAT has a proven track record for getting rid of unwanted grasses and weeds, even under less-than-ideal weather conditions. A non-selective contact herbicide, DIQUAT will burn back or control nearly anything green to which it is applied.
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Check the savings on DIQUAT versus a more expensive application of ROUNDUP.® DIQUAT does the job with a substantial savings! Get DIQUAT Herbicide H/A—and wipe out problem weeds, fast!
Avoid accidents. For safety, read the entire label including precautions. Use all chemicals only as directed.
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PREVENT DOLLAR SPOT, BROWN PATCH AND OTHER DISEASES EARLY, BEFORE THEY BECOME A PROBLEM.

You don't want to be put on the spot; use the Banner® preventive program. Banner works systemically to control disease from the inside out. Once absorbed by the leaf and stem system, Banner won't wash off and keeps on working after drying, unaffected by rain or irrigation. Used as directed, Banner is safe to turf and applicators.

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How to prevent dollar spot

Apply Banner at a 1 oz. rate early (April-May through September) to prevent dollar spot from ruining your greens for full 28-day control.

How to prevent brown patch and other diseases

Apply Banner at the 2-4* oz. rate (May or June through September) for 10-21 day brown patch control. And at 1-2 ozs., Banner provides excellent systemic control of anthracnose, powdery mildew, rust, red thread and stripe smut. Or, use Banner at the higher 2-4* oz. rate to achieve broader-spectrum control of leaf spot and melting out for 14-21 days. And the 4* oz. rate for summer patch and spring dead spot at 30-day intervals.

Tank mix Banner to control already-present brown patch

As with all turf fungicides, Banner's scheduling is critical. But when schedules are interrupted and brown patch is present, use Banner at a 2 oz. rate in a tank mix with contact fungicides like Daconil 2787® or Chipco® 26019. The contact fungicides will control existing diseases and Banner will prevent future infections.

New Banner. Unsurpassed protection for greens, tees, and fairways. And you'll know it on inspection day. *4 oz. label rate pending

BANNER. LONGER LASTING, PREVENTIVE CONTROL.

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SOIL-APPLIED SYSTEMIC INSECTICIDES

These insecticides are a viable alternative to foliar applications, which sometimes raise concerns in the areas of drift and effects on non-target organisms.

by Whitney S. Cranshaw, Colorado State University

Certain insecticides have the ability to move systemically within the sap stream of plant tissue. These "systemic" insecticides can often provide improved plant coverage. They are also particularly effective for control of insects living within foliage (e.g., leafminers, gall makers, leafcurling aphids). For several plant protection purposes, systemic insecticides are superior to non-systemic insecticides with purely "contact" activity.

Relatively few insecticides have systemic activity. All those currently used in woody plant protection are limited to the carbamate and organophospate insecticide classes (Table 1). These systemic insecticides are variously applied to foliage, in trunk injections and as soil treatments.

All systemic insecticides are capable of moving systemically within the plant following foliar application. This remains the greatest use of systemic insecticides in landscape plant care since many commonly used insecticides, such as acephate (Orthene) and dimethoate (Cygon) have systemic activity when sprayed on plants. Following foliar applications, these systemic insecticides move within the leaf and often travel upwards in the plant to a limited extent.

A lesser number of systemic insecticides are also capable of being picked up by roots following soil applications.

Many systemic insecticides (e.g., acephate, mevinphos) are decomposed rapidly or are absorbed by soil particles following soil treatment.

Some soil-applied systemic insecticides remain in effective concentration within the soil before root uptake. After uptake, they move in the xylem and are later also diffused more generally through the phloem by radial transfer. Subsequent movement of systemic insecticides within trees is highly dependent on the tree's respiration and growth. Generally the insecticides become most concentrated in more rapidly-growing tissues.

Some remobilization of insecticides may occur, such as from older needles to new needles, but usually herbicide breakdown in the plant is rapid enough to allow maximum effective persistence of a few months.

Soil systemic insecticides can be variously applied, but all require that the material be injected below ground into the root zone. Granular formulations are placed in holes dug around the base of the plant. Solid forms exist as fertilizer/insecticide spikes or as cakes used for root feeder systems.

Liquid formulations are perhaps the most easy to apply. One of the

The author is an assistant professor and extension entomologist in the Department of Entomology, Colorado State University.

Table 1.

Characteristics of systemic insecticides used on landscape plants.

Common name	Trade names	Remarks
oxydemetonmethyl	Metasystox-R 2, Inject-A-Cide	Moderately toxic. Available as trunk injection or soil application in liquid formulation. Foliar treatment uses have been eliminated. Recent label improvements have clarified soil application uses.
dimethoate	Cygon, Dimethoate	Moderately toxic. Primarily used as a foliar spray but has soil systemic activity. Soil appliction uses limited to a few states with Special Local Need registration. Liquid formulation.
acephate	Orthene, Isotox, Acecap	Moderate-low toxicity. Primarily used as foliar treatment. Also available as trunk implant. Not-effective as soil treatment. Liquid and solid implant formulations.
carbofuran	Furadan	Highly toxic and Restricted Use. National labelling allows soil systemic application use of granular formulation for control of insects of cottonwood, elm, and pine. Some state labelling for use of liquid formulation.
disulfoton	DiSyston	Highly toxic and Restricted Use. Used as soil systemic application in granular formulation. Broadly labelled for use on woody plants.
dicrotophos	Bidrin, Inject-A-Cide B	Highly toxic and Restricted Use. Only available in liquid formulation for trunk injection uses.

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NOW AVAILABLE IN NEW GRANULAR FORMULATION

Now you have two choices–TURCAM® WP liquid or new TURCAM® 2½G granular. Whatever your choice, TURCAM's advanced carbamate chemistry goes right to work knocking down white grubs, mole crickets, chinch bugs, sod webworms and many other destructive pests. TURCAM's federally-approved nationwide label provides these positive benefits...

- **Fast action**
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Powerful reasons for assigning TURCAM to your toughest turf pest control problems. For more information on TURCAM, including full labeling and recommendations for use, contact your local distributor or write to...

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IMPORTANT: Please remember always to read and follow carefully all label directions when applying any chemical.

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Table 2.

Summary of Colorado State University control trial results using soil applied systemic insecticides, 1984-1987.

Target Pest	Insecticide	Degree of Control
Honeylocust pod gall midge	Metasystox-R	Fair-Good
Honeylocust pod gall midge	DiSyston	Poor
Honeylocust spider mite	Metasystox-R	Excellent
Honeylocust plant bug	Metasystox-R	Poor
Honeylocust rust mite	Metasystox-R	Fair-Poor
Honeysuckle aphid	Metasystox-R	Excellent
	Cygon/Dimethoate	Excellent
Ash leafcurl aphid	Metasystox-R	Excellent
Pinyon spindle gall midge	Metasystox-R	Fair-Poor
	Cygon/Dimethoate	Excellent
Pinyon tip moth	Metasystox-R	Good
	Cygon/Dimethoate	Excellent
Hackberry nipple gall	Metasystox-R	Good
Hackberry bud gall	Metasystox-R	Poor
	Cygon/Dimethoate	Good
Elm leaf beetle	Metasystox-R	Poor

simplest application techniques involves use of low-pressure equipment of the Kioritz system which injects the fluid several inches below ground. Regardless of the application technique used, treatments are applied to multiple sites around the tree. To allow insecticide uptake, soil in the treated area must remain moist for several days after treatment.

Recently there has been increased interest and availability of soil-applied systemic insecticides for insect and mite control in landscape plants. This has been largely the result of increased concerns and limitations of foliar applications due to problems with insecticide drift and effects on non-target organisms such as beneficial insects, wildlife and clients.

Also important are recent improvements made in the label instructions of at least one soil-applied systemic insecticide, Metasystox-R2, which clarifies its use in landscape protection.

In light of the increased interest in soil systemic insecticide applications, a review of advantages and disadvantages of these treatments is in order.

Advantages

Effectiveness on insects and mites. Soil-applied systemic insecticides are highly effective for control of a wide variety of insects and mites that feed on plant foliage. A summary of recent Colorado State University control trials with two systemic insecticides, Metasystox-R2 and Dimethoate 400, is listed in Table 2.

In general, sucking insects appear to be better controlled than chewing insects by these treatments. Control is usually marginal of insects that bore within woody plant parts or of scale insects feeding on bark—presumably because the insecticide does not concentrate at these sites. Persistence of soil-injected systemic insecticides is often superior to that of foliar-applied insecticides.

Drift. A strong advantage of soil-applied systemic insecticides is the elimination of drift associated with spray applications. Soil systemic insecticide applications are limited to the below-ground areas of the plant. They should not drift onto adjacent properties if properly used.

One area requiring research attention is the possible problem of soil-applied systemic insecticides moving into groundwater.

Agriculture-related problems with the highly water soluble insecticide aldicarb (Temik) are well-publicized. Although the insecticides used in soil-applied systemic treatment of landscape plants have not been associated with similar problems, caution is advisable.

Ease of application. Soil-injected systemic insecticides can be substantially easier to apply than foliar treatments. Injection equipment is often portable and capable of being moved easily to hard-to-reach sites. Applications can often be made rapidly and pre-site preparations to cover furniture, fish ponds, etc. can be reduced.

In areas of considerable rainfall, soil injections can be made during periods when foliar sprays are not possible.

Finally, soil injection treatments may be more favorably considered by ordinances which limit or require notification postings of "air-borne" pesticide applications.

Non-target impacts. Soil-injected insecticides that move systemically within plants are often "easier" on benefical insects such as honeybees and insect natural enemies that do not feed on plant tissue. Nesting birds are also not inadvertently treated during application.

Phytotoxicity. Phytotoxicity remains a potential problem for soil-applied systemic insecticides as well as for foliar or trunk injection treatments. Although some buffering of phytotoxic effects does occur when insecticides are applied to the root zone rather than directly to plant tissue, damage can occur. Species sensitivity to the insecticide, insecticide rate, soil conditions and plant physiology all can affect this phytotoxic response. Expanded use and experience with these treatments will help define phytotoxicity risks.

Applicator safety. Relative applicator safety of soil treatments versus foliar treatments is mixed. On the positive side, soil applications should not typically involve the degree of inhalation exposure hazard that occurs during foliar treatments. Also, application equipment for soil applications can be simpler, involving low-pressure, and less susceptible to accidental exposure following equipment failures.

Conversely, use of soil-injected systemic insecticides typically involves the transportation and handling of highly concentrated pesticide in contrast to dilute mixtures used for spraying. Moreover, the relative toxicity of insecticides with systemic activity typically is much greater than commonly-used foliar treatments such as carbaryl (Sevin), malathion or fluvalinate (Mavrik).

Hazards with accidental exposure are greatly increased if high pressure application equipment is used. Additional training, a very high level of attention to equipment maintenance and the use of protective equipment is

1. Rolling back sod where TerraFlow lines will run. 2. Cutting 2" wide trench. 3. Laying TerraFlow lines in 12" deep trench. 4, 5. Joining TerraFlow lines using only a utility knife and duct tape. 6. Fully installed TerraFlow System. Workers backfill with site soil, puddle with sand. 7. Replacing sod. 8. Completed TerraFlow System. Installation time: about 100 ft. per hour. 9. Green was back in play in 2 hours with TerraFlow. (Photos by Greg Fast, Turf Irrigation Supply, Englewood, Colorado.)

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7557

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essential with soil-injected systemic insecticide applications.

Pesticide use rates. The amounts of insecticide used in soil systemic application are extremely high. For example, the amount of Metasystox-R2 used for insect control on a single one-foot diameter tree approach the use rates of equivalent insecticides used on an acre of an agricultural crop. The high use rates have expensive product costs and must cause some pause when considering the amount of pesticides being applied in the environment.

Precautions

Using soil-injected systemic insecticides clearly has strong advantages that will increase their future use in landscape plant protection. However, limitations also exist. It is suggested that certain precautions, preferably included on label directions, be followed.

Labelling. Labelling soil systemic insecticides for use on woody plants is quite limited at present (Table 1). However, there is evidence that many manufacturers are now giving increased attention to ornamental pesticide labelling. In the past, this has been a highly neglected area in marketing plans of many insecticide manufacturers. It is being corrected, due to sluggishness of the traditional agriculture markets and the green industry's increased visibility. Availability of soil systemic insecticide uses can be expected to increase.

Protective clothing needed. Because of the innate toxicity of systemic insecticides and their use in concentrates, full protective clothing should always be required.

Hazards involved in handling and applying soil-injected soil systemic insecticides require special applicator training. By making these products Restricted Use pesticides, use by certified, trained professional applicators is ensured.

Elimination of pressurized application systems. Accidental exposure and injury is greatly increased by application of insecticides under high pressure. Equipment breakage and blowing of pesticide from injection holes are two likely means of inadvertent exposure during application.

Restriction of applications near groundwater sources. The extreme attention and interest in groundwater protection from pesticides and pollutants requires that all pesticide applications be made in a way that eliminates pollution risks. Use of soil injections near wells and low-lying aquifers should be restricted until their safety is demonstrated. **LM**

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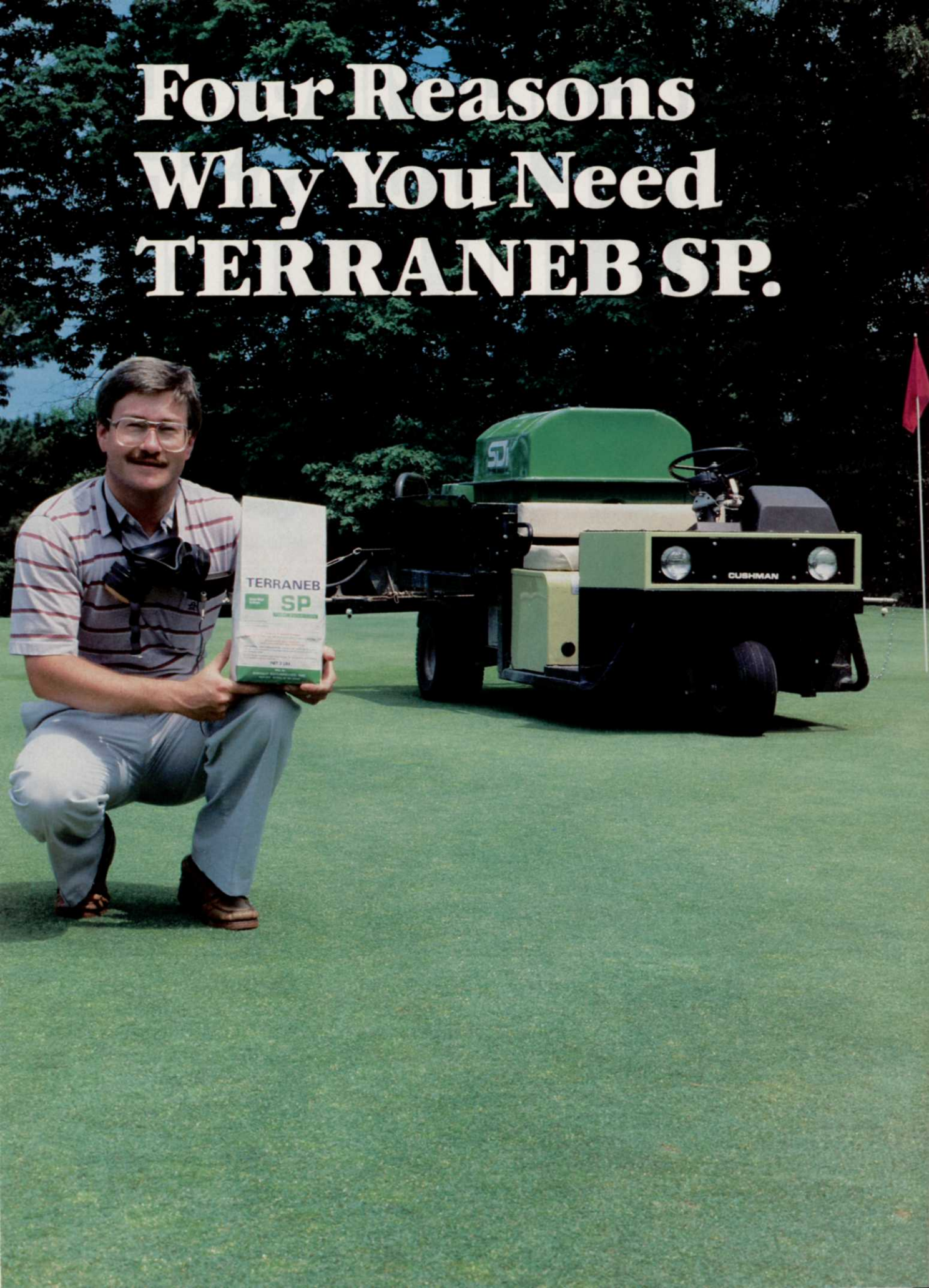


1 BROWN PATCH

The most common turf disease, Brown Patch, can destroy a stand of bentgrass within a few days. Prevalent during extended periods of high temperature and humidity, the disease is also encouraged by poorly drained soil, lack of air circulation and excessive nitrogen. At first it appears as a circular area of light brown grass, ranging from a few inches to several feet long. The circular areas grow and turn brown.

2 SCLEROTIUM BLIGHT

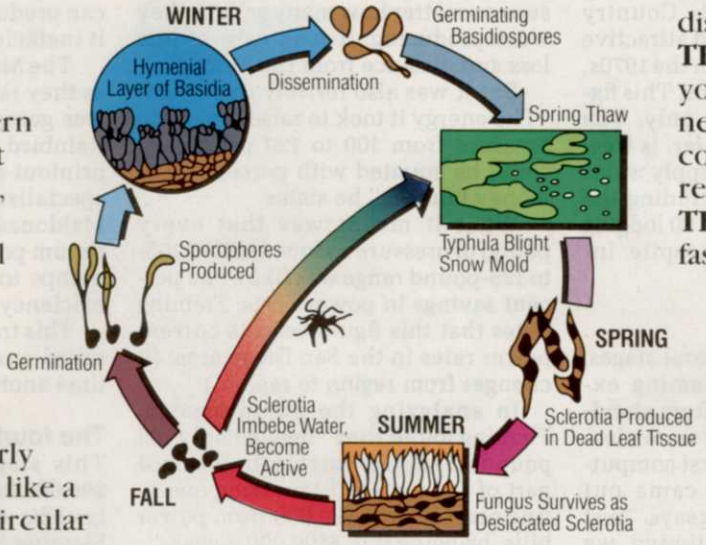
Also called Southern Blight, Sclerotium Blight attacks annual bluegrass, Kentucky bluegrass, ryegrass and bentgrass in all sections of the country. The fungus begins to spread from the soil and surrounding debris to the grass during hot, humid weather. In its early stages, the disease looks like a frog-eye, having small, circular dead areas with tufts of apparently non-diseased grass. The circles may grow up to three feet in diameter.

3 PYTHIUM

Pythium attacks all cool season turfgrasses and Bermudagrass, especially grass seedlings, which will die (damping off), resulting in irregular dead patches in the turf. Normally, it is a high temperature, high humidity and wet weather disease. Mower movement will spread fungus from diseased areas to healthy areas, thereby quickly spreading the disease. Late stages of pythium can spread very quickly and can kill large, irregular sections of turf in 24 to 48 hours.

4 GRAY SNOW MOLD

Also known as Typhula Blight, Gray Snow Mold attacks most northern turfgrasses. The disease usually develops under a snow cover and is seen as the snow melts. Fungus development is favored by high soil moisture and temperatures between 32° and 40° F. Usually visible at the first spring thaw, it appears as circular dead areas up to 6 inches in diameter, but can grow to 2 feet or more and eventually kill large irregular areas of turf. Typhula Blight not only attacks foliage, but infects deep into the crown area, completely destroying the grass plant.



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IRRIGATION ECONOMICS

Efficient irrigation pump use and precise cycle scheduling cut power costs in half for Singing Hills Country Club and Lodge.

by Jeff Sobul, associate editor

Dehesa Road winds up, around and down one of the numerous hills east of San Diego, Calif. About two-thirds of the way down the east side, the road winds around a corner. For the first time, the valley below comes into view.

The green-carpeted valley is a sharp contrast to the surrounding brown, scrubby hills. The cost to keep that carpet—Singing Hills Country Club and Lodge—green and attractive was about $140,000 a year in the 1970s, based on today's power rates. This figure reflected power costs only. The water, taken from an aquifer, is free.

Since 1980, the cost to supply water to the 54-hole facility, including the clubhouse, tennis club and 80 lodging units, was cut in half despite increased power costs.

The first cut

The decrease came in several stages, superintendent David Fleming explains. In 1980, "we went from stand-alone field controllers that were electrical/mechanical to the first computerized system Rainbird came out with, the Maxi II," Fleming says. "Just by getting more accurate timing, we reduced our power bills to $120,000."

Efficient scheduling also reduced the time it took to water the 320 acres from 12 hours to eight.

The second cut

Fleming and his staff took aim at the pumps in 1982. His was a traditional pump system rated at 110 to 125 psi. "For some reason years ago," he says, "(manufacturers) decided pumps would produce 125 pounds of pressure no matter how many gallons they were producing. It took care of line loss and distance from the pump."

But it was also terribly inefficient. "The energy it took to raise the pump pressure from 100 to 120 psi almost could be equated with percentage of money burned," he states.

What it meant was that every pound of pressure reduced in that 105- to 125-pound range was like a one percent savings in power costs. Fleming notes that this figure reflects current power rates in the San Diego area. (It changes from region to region.)

In analyzing the pump system, Fleming found they "needed only 105 pounds to supply water to the weakest part of the system." Lowering operating pressure cut $20,000 from power bills, bringing it to $100,000 a year.

The third cut

In 1985 the course installed the updated Maxi III system. "With the Maxi III controllers we were able to analyze the pump stations," Fleming says. "Each pump can produce so many gallons of water at its optimum point on a pumping curve. If you're pumping fewer gallons, you're running the pump at an inefficient point. If you're asking for more water than the pump can produce, then you're also running it inefficiently."

The Maxi III monitored the stations as they ran and told how much water was going through the course's 3700 Rainbird 51 SAM sprinklers. A daily printout gave Fleming and irrigation specialists, Mitch Glanis and Tamo Maldonado, the data to reach that optimum point. "We could schedule the pumps to be run at their maximum efficiency point," Fleming says.

This translated into another $5,000 saved annually. It also cut watering time another two hours, down to six.

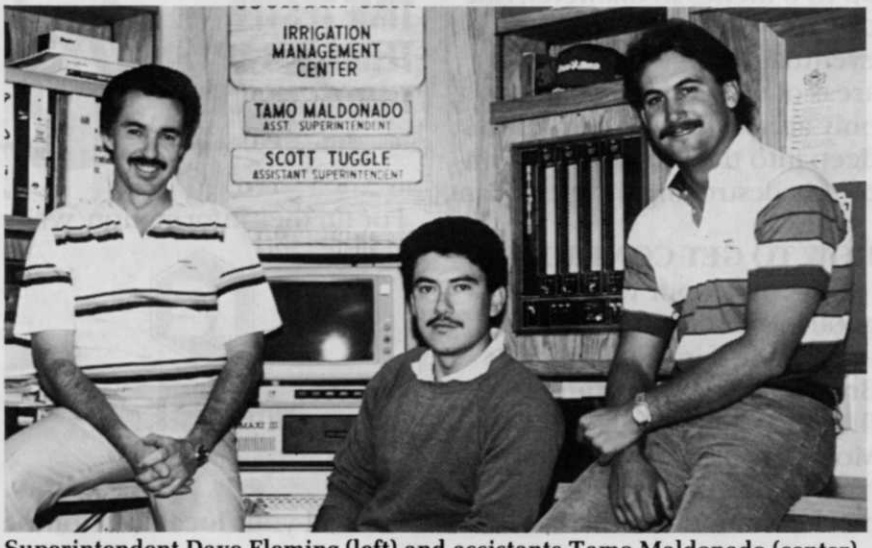
The fourth cut

This stage, which cut costs from $95,000 to $78,000, illustrates well the benefits of efficient watering cycles. Fleming began a system of what he calls "blanket application," based on soil infiltration rates, "not based on technical data on soil but on what actually happens in the field; not what happens on one cycle but on the total irrigation time. How do you get that water on and avoid runoff?" he asks.

The key was matching the application rate to infiltration rate. This keeps applied water on target, not running off into low spots and causing localized hot spots in higher areas. If they were watering a green for 10 minutes in five two-minute cycles, the computer could "introduce pauses so that the last few cycles don't go on at the same interval," he explains. "There's a little more soak time before we bring on another blanket." And less water wasted.

The final cut

Singing Hills cut another $4,000 from its power bills in the second half of 1987 by taking advantage of off-peak power rates offered by the local util-



Superintendent Dave Fleming (left) and assistants Tamo Maldonado (center) and Mitch Glanis used the Rainbird Maxi system to halve irrigation power costs.

ity. Rates between 10 p.m. and 6 a.m. dropped to six cents a kilowatt hour (KWR) from 13 cents/KWR at peak (10 a.m. to 6 p.m.) and eight cents/KWR at semi-peak (the four hours on either side of off-peak). "That's a real motivation to get all my irrigation done in that period," Fleming says. Day watering is kept to the bare minimum because stiff penalties are levied for peak-hour watering. "We take the Maxi and program our irrigation to start at one minute past 10 p.m."

Thus, the savings came in three ways, Fleming says. Proper scheduling reduced water used, which saved in pumping power cost. The water savings, though not translated into cost per gallon or acre-foot, were huge, especially since semi-arid area has limited water sources.

In the 1970s, Singing Hills used 2.7 million gallons a night, about eight acre-feet a year per acre. With the Maxi III, that figure is down to 1.2 million gallons per night, 4.15 acre-feet a year per acre.

Secondly, using the Maxi system, the staff vastly improved the operating efficiency of existing equipmemt. The final savings came with the switch to off-peak power use.

Future efficiency

Fleming admits that his current pump system is somewhat obsolete, though the pumps are tested yearly for efficiency. "Variable frequency (VF) pumps, right now, are the best things going for big water users and big pump people," he says. The system's computer varies pump pressure to match the amount of water being pumped.

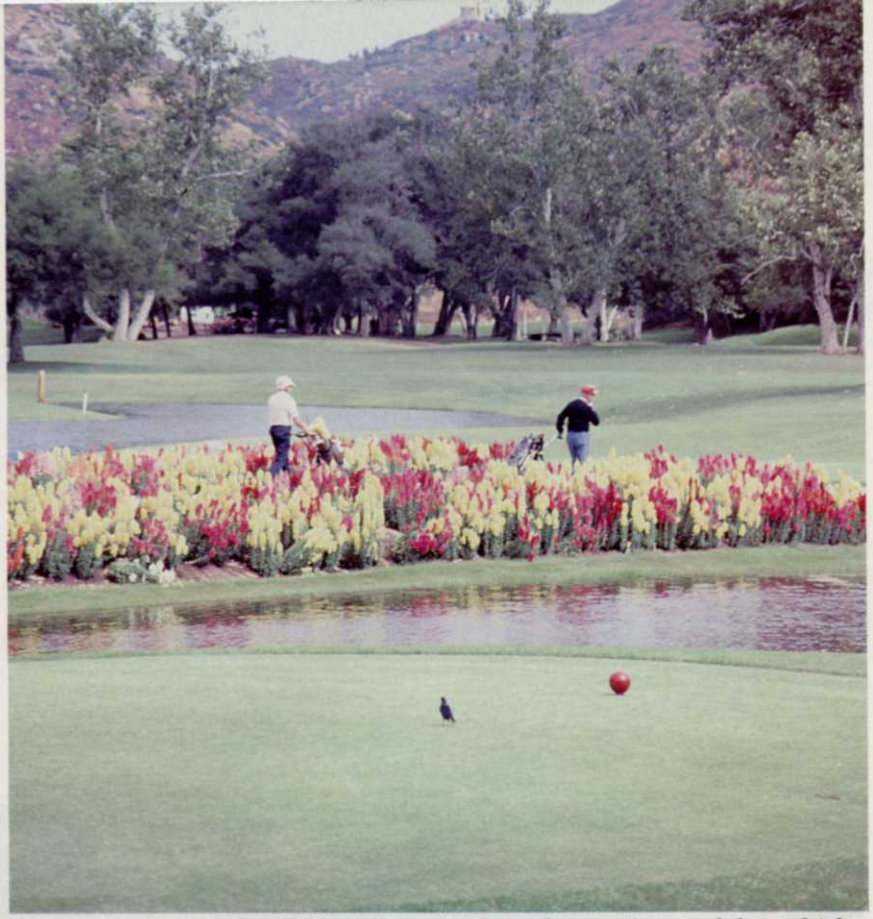
"Whether you're putting down 200 GPM or 700 GPM, you're using the pump at its most efficient point because of the change in frequency," he explains. "I don't have that, so the only thing I can do is schedule my pumps with the computer."

Fleming estimates that a VF pumping system can pay for itself in three to five years on an inefficient course like Singing Hills was in 1979.

Last year, Fleming upgraded to Maxi ET software, which uses a weather station to monitor evapotranspiration (ET). So far, he has allowed the station to control irrigation on only one hole at a time. But he sees the day when weather stations will control all 54 holes.

He further expanded ET monitoring by using Standard Oil's ST-27 Turf

Keeping Singing Hills Country Club and Lodge green in the arid Southern California climate is still a costly task even with an irrigation system at peak efficiency.



After irrigating, Singing Hills pulls water from the aquifer into lakes which act as settling tanks. The process takes 12 to 15 hours.

Monitor. The portable unit functions much like a weather station and is good for diagnosing local hot spots before visible symptoms occur.

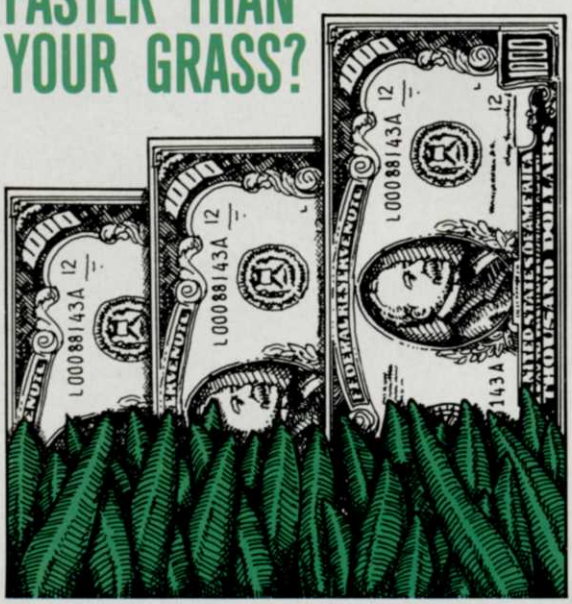
Fleming and his staff continually test different irrigation equipment on a small scale. He is testing Toro and Hunter low pressure heads and has the Hunter I-44 Sod Cup Sprinkler installed on one green.

"It's going to be one of the real innovations of the future," Fleming says. The I-44 has a living plug of turf in a cup in its top. When retracted, the head disappears into the putting surface." It will allow a freedom of green design which in the past was constrained by head spacing patterns."

Fleming, who has begun a management group called Golf Properties Management, says future irrigation efficiency will involve weather stations, low pressure systems, bigger mainlines to reduce watering time and pressure loss and off-peak hour watering if lower rates are available.

The main philosophy of his company is its ability to cut a course's irrigation costs, sometimes by 50 percent, using new computerized systems like the Maxi. In Southern California that can be a pretty big chunk of change. **LM**

ARE YOUR MAINTENANCE COSTS GROWING FASTER THAN YOUR GRASS?



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The 2020 can go through a 36-inch yard gate to enter backyards or other confined jobsites.

obstacles in backyards, easements and other confined work areas. The 2020 is easy to operate and maintain. An enclosed gearbox, a one-piece rigid frame and a simple hydraulic system ensure reliable production.

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510 Compact Trencher

Some jobs only require narrow, shallow trench. The 510 disc trencher can dig 10-inches deep at widths from 1½ to 2 inches. Simple design makes it dependable and easy to use. The trenching disc is equipped with a protective shield, and the unit has an operator presence control system. The 510 is so compact it will fit in a station wagon or van.

The compact 510 digs trench 10 inches deep, 2 inches wide.

Radiodetection is a registered trademark of Radiodetection Corp., Ridgewood, NJ.

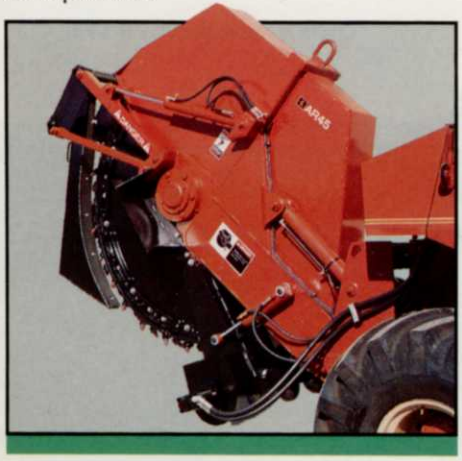
The HT100 is a 100-HP-class track machine that can either be a vibratory plow, trencher or earth saw.

HT100 Trencher/Plow

The HT100 is a 100-HP-class vibratory plow, trencher or earth saw that is mounted on tracks for flotation and effective traction. It is a tough, hard-working machine that accommodates most R100 Modularmatic® modules. It has a tilting frame for vertical wall trenching or plowing on slopes, and a 3-speed hydrostatic ground drive system with counter-rotating tracks that allow it to turn in its own length.

Ditch Witch Earth Saw Modules

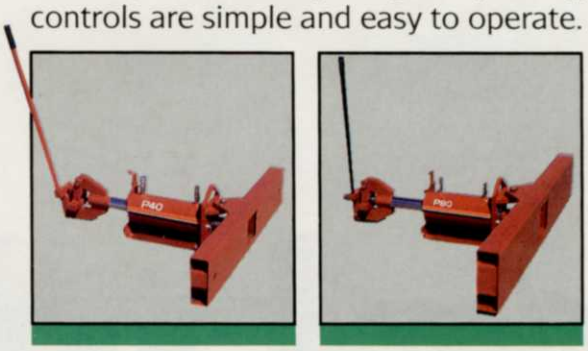
Cut trench in frozen earth, rocky soils, asphalt, even concrete with Ditch Witch earth saws. Four models now provide saw modules for Ditch Witch equipment from 30- to 100-HP-class machines. The Ditch Witch rigid frame lets you cut straight trench. New models offer a trench cleaner and auger spoil removal system as options.



Earth saws are designed to dig in tough conditions, and feature carbide bits that are easy to change.

P40/P80 Rod Pushers

These new rod pushers from Ditch Witch operate in narrow trenches where larger equipment can't be used. They are compact and lightweight, yet powerful enough to push longer distances than similar types of equipment. P40/P80 rod pushers are bidirectional and have equal force for pulling and pushing. The controls are simple and easy to operate.



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Circle Reader Service # 125.

PZ1

Phil Cavotta (left) wears many hats. Here, he and foremen Tony Gabriele (center) and Fran Cavotta examine blueprints of the recently-completed Galleria (background).

CAVOTTA'S CLEVELAND

In the competitive Cleveland market, one name means landscaping: Phil Cavotta tells how he keeps his business successful.

by Heide Aungst

Phil Cavotta is more than a landscape contractor. He's a philosopher, of sorts.

"I'm like the guy who complains about having no shoes, until he sees a man with no feet," says Cavotta, one of Cleveland's leading landscapers. "I might do a big job of say $100,000, but I'd like to do a million. The next goal might be a million and three-quarters."

Although he's a high goal-setter, he's quick to come back to earth. "It's not the gross, it's keeping your reputation and it's your rapport with people."

Where he comes from is Cleveland, Ohio. Cavotta, vice president of CLI (Cavotta Landscapers Inc.), runs the company started by his grandfather in the 1920s. His grandfather passed the business on to Cavotta's uncle, who ran the garden store, and his father, who ran the landscaping operations.

Cavotta, 35, learned his profession by working closely with his father. Today, the company is 75 percent installation, 25 percent maintenance. To his credit are big jobs, such as the world-famous Cleveland Clinic, which hosts the King of Jordan during his checkups

← Circle No. 125 on Reader Inquiry Card

A CORPORATE DECISION

Phil Cavotta has learned only too well the truth behind the old adage, "When it rains, it pours."

Not only were Cavotta's crews tied up trying to finish landscaping Cleveland's Galleria last October, but they also had to cope with installation of a giant retaining wall at the city's 40th Street Service Center.

And the weather didn't help.

"We made a corporate decision to take on two jobs totalling close to $1 million at the same time," says Cavotta. "But to coordinate two jobs that size, together, was some task."

The Galleria posed the most problems while the Service Center was the more labor-intensive.

"We worked 24 hours a day," Cavotta remembers. "I had to wear a lot of hats. I was at the Galleria an average of 18 to 20 hours a day for two straight weeks."

One of the problems the Galleria posed was that the landscaping was done over an underground garage. Because of the excessive weight on the garage roof that would be created by soil, $100,000 worth of styrofoam was substituted. The styrofoam was topped with a one-third peat, one-third sand and one-third shredded topsoil combination before plant materials were brought in.

Another problem was the Galleria's location—right in the heart of downtown Cleveland where there was no parking available—and the timing—all the contractors were working to make the same deadlines. ("I must have have $1,000 worth of parking tickets," Cavotta says. And his feelings about working with the continued interference of other contractors: "If we would've had baseball bats, we would've beaten each other to death.")

The Service Center retaining wall was 38 feet high and more than 200 feet long. It took 10,000 cement blocks, each weighing 108 pounds. Also involved was the installation of hundreds of trees and shrubs, a sprinkler system and 11,000 yards of bluegrass sod.

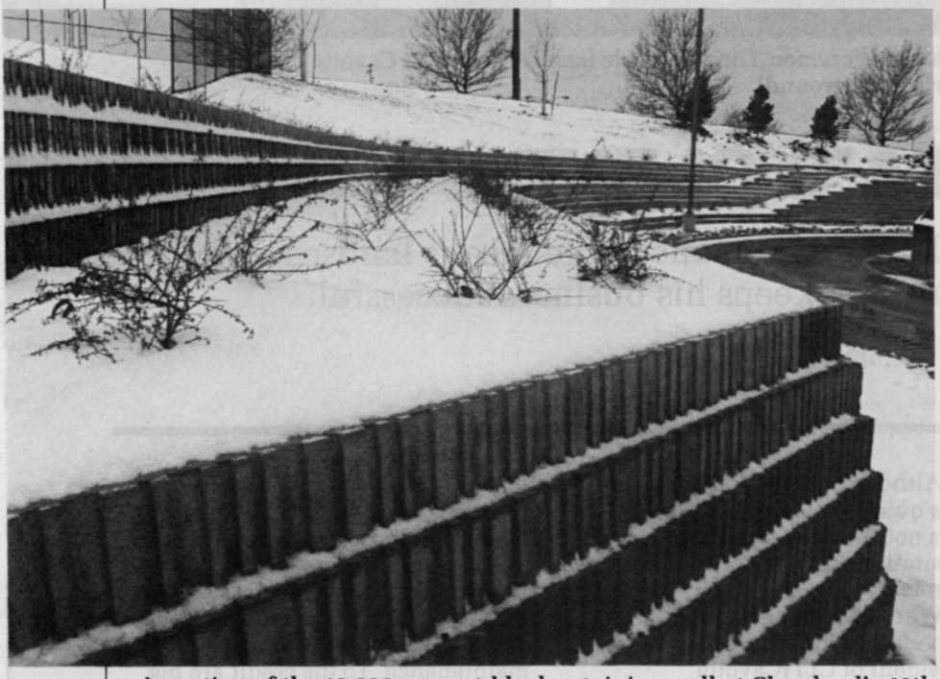
"The hardest part of that job, for me, was making the bid. It was the first time in the city's history that a wall like this was built," Cavotta recalls.

The job took five-and-a-half weeks.

And what did Cavotta learn from the hectic experience?

"There's no way a landscaper knows everything!"

—*Jerry Roche* □



A portion of the 10,000-cement-block retaining wall at Cleveland's 40th Street Service Center that took more than a month to install.

(see *Weeds, Trees & Turf*, Sept. 1986, p. 35). Cavotta also installed and maintains the Galleria, Cleveland's newest downtown shopping mall under glass.

Cavotta employs 23 people at peak-season, six in the off-season. He owns 14 trucks, from a pickup to a tractor/trailer. He swears by 21-inch Jacobsen mowers.

In 1987, Cavotta made more than $1 million. He plans for more growth by playing by the rules, and by making up his own rules.

Following the rules

Five of Cavotta's employees work five days a week for eight months on the Clinic's 80 acres. Because of the hospital's patients, Cavotta's crew follows strict guidelines. "We can't spray during daylight hours," he says. The crew sprays after midnight, when most everyone's asleep and not walking the grounds.

Another rule crews must follow is keeping equipment noise levels down. The Clinic dictates a certain decibel level which can't be exceeded.

Breaking the rules

Still, when Cavotta has a chance to use his ingenuity to get around a problem, he will. And the expressive Italian might just add a hint of rhetoric, too.

"We look at a job and ask, 'Can we do it?' Eventually we come up with an idea," he says.

One of his favorite jobs was the Galleria.

"At first, it was a nightmare," he recalls. That nightmare consisted of

When dealing with his employees and clients, tricks just won't do.

22-hour days to meet the owners' strict Oct. 15, 1987 opening. The weather simply wouldn't cooperate.

"You can fight labor problems...you can fight mechanical problems...but you can't fight the weather," he laments. "What are you gonna do, call God and say 'Hey, turn off the water on East 9th Street?'"

The architects designed the Galleria landscape so that 55 maple trees would be planted on top of an underground parking garage. But Cavotta quickly recognized that the

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amount of dirt needed to complete the planting job might make the roof cave in. "We talked about the job for months. We even called a roofing contractor," he remembers. The consensus solution was to use a light non-biodegradable foam, with 1,800 yards of dirt on top of it.

That was also the most expensive solution. The foam itself cost $100,000. The next trick was to use a 150-ft. conveyor to get the trees to the roof.

Business philosophy

When dealing with his employees and clients, however, tricks just won't do. Cavotta is a straightforward up-front kind of guy. A family-owned business such as CLI is exactly that—family, whether or not the employee is actually a blood relative. And Cavotta stays close. "I know all their birthdays," he says, referring to his key personnel. In fact, after the successful Galleria project was completed, he took his foremen and their families to the Bahamas...and picked up the tab.

Running a family-owned business, of course, isn't always easy. "A lot of times if you mix personal feelings with business, it comes back to haunt you. Business is business...family is family."

He even relates his work to family. Asked which landscaping project has been his favorite, he answers: "That's like asking a father which child he likes the most. One's a doctor, one's a lawyer and one's a shoemaker. But you love them all the same."

Just as parents admit they make mistakes, Cavotta easily confesses his. "I've made some mistakes on jobs, like an omission on a bid," he says. "But you learn. It's not all honey out there. There's a lot of vinegar."

Once, on a railroad land reclamation project, he and the hydroseeding crew had to cross a bridge to access parts of the job. While they worked, someone took the bridge down. "Now I'm on the other side of the river..." with no way back. That was one of those little things not usually planned on.

'It's not all honey out there. There's a lot of vinegar.'

—Phil Cavotta

Planning ahead

If there's one thing Cavotta has learned through the years, it's to plan ahead for what *can* be planned. "I wear a lot of hats," he says. "One day I'll be behind a machine moving snow, the next I'm looking at blueprints."

Through such versatility, he's been successful in the competitive northeast Ohio market.

He also knows his plant materials, which is a necessity with climate changes affecting areas near Lake Erie. On the average, for every 10 bids he makes, he is awarded one job. But that's better than most. "My name is synonomous with landscaping in this city," he says proudly. His next goal is to do a project outside of Ohio, "something people can relate to, like the White House."

His secret formula for success probably won't change: "Shoot high...and never forget where you come from." **LM**

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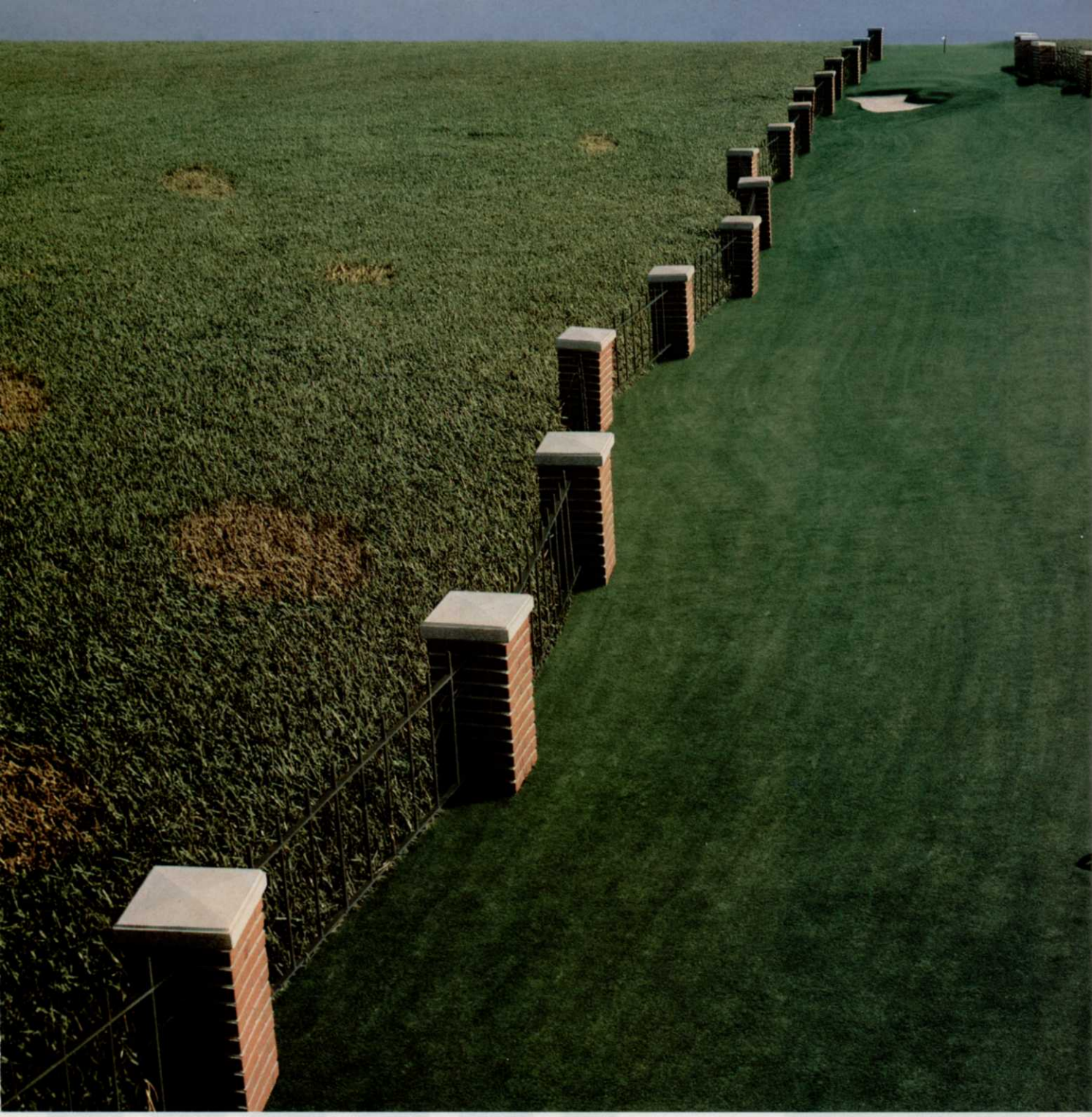

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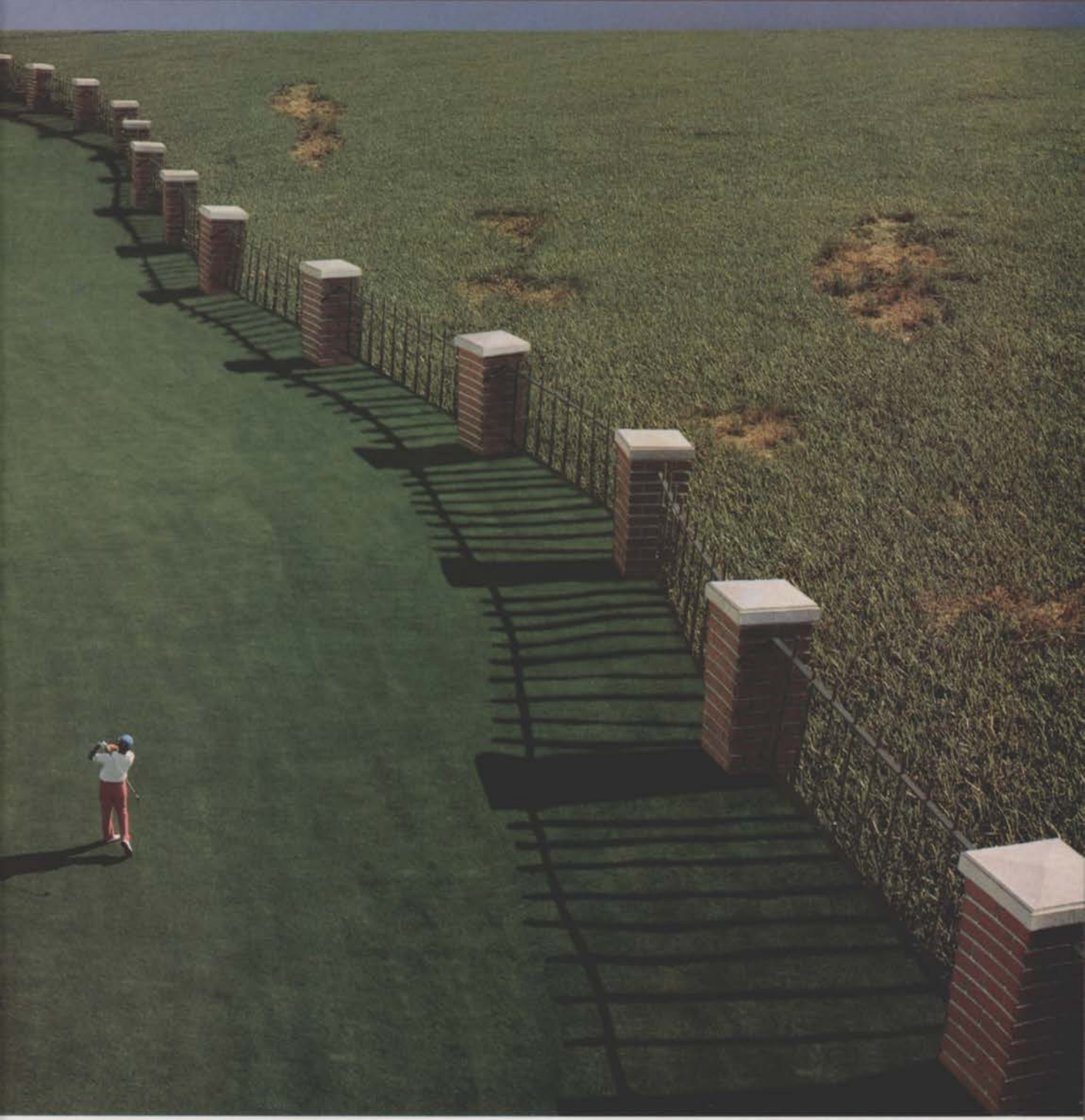

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Desert landscaping has become more accepted for the aesthetics—the open landscape, the filtered light effect from using palo verde trees.

'SCAPING ARIZONA

In the arid parts of this country, there is a recent trend toward more native plants and less forced use of turfgrass. The practice is called 'desert landscaping,' and here's what you should know about it.

"There is a recent trend," says landscape architect Steve Martino, "to want Arizona to look like Arizona."

First in Tucson and now increasingly in the Phoenix area, traditional landscapes of the Midwest and California are losing ground to the look of the native Sonoran Desert. Turf areas are smaller. Desert plants increasingly are in demand. Decomposed granite and brittle bush replace Bermudagrass as ground cover. Mesquite and ironwood replace mulberry and olive trees. Jojoba replaces hibiscus.

Usually referred to as "desert landscaping," it's a challenging new ball game for the green industry in the southwest.

One of the pioneers in using desert plants is Steve Martino & Associates, a Scottsdale-based landscape architecture and planning firm. Martino has specified native desert plants into landscapes for 12 years.

Martino prefers to call it "native plant landscaping." The word "desert" misses the mark, he says.

In this type of landscape, native desert plants and plants from other arid regions of the world like Australia are used to provide the traditional benefits of landscaping: shade, privacy, screening and aesthetics.

"I've tried to show that native plants can be used in landscaping and you gain the benefits without losing anything," Martino says. It looks natural. It works. And it's catching on.

While desert plants require less watering, trimming and mowing, some maintenance is required.

Desert demand

"Demand this year for desert plants is unbelievable," says nurseryman Mark Mohlenbrock. "It happened in Tucson earlier, but the Phoenix area has really caught on to using low water-use plants this year. More so than ever before."

Mohlenbrock is production manager and research botanist for Greenworld Nursery Products, a wholesale and retail nursery in Phoenix. For several years, he kept small supplies of desert plants he knew would catch on "someday." This year those supplies were exhausted early.

The increasing popularity of desert landscaping is due largely to three factors.

- Water conservation. "People are becoming more aware of water use in the desert," Mohlenbrock says. "Most new developments call for low water-

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Circle No. 121 on Reader Inquiry Card

use plants. Many of the metro communities here in the Valley have come out with lists of plant material accepted for city jobs and commercial developments. They're not outlawing the heavy water users, but there certainly is a real discouragement against using them. And some are banned because they're allergenic."

● Aesthetics. "Desert landscaping has become more accepted for the aesthetics—the open landscape, the filtered light effect from using palo verde trees," Mohlenbrock says. In the desert landscaping around his own home, Mohlenbrock says, he has 50 different species. "I've got all different shapes, all different textures and something that blooms every single month of the year."

● Low maintenance. "Desert landscaping or low water-use landscaping requires a lot less maintenance," Mohlenbrock says. Less watering is needed. Most desert plants are not meant to be tightly pruned. "And you don't have to go out and mow your grass every day," he says.

Both Martino and Mohlenbrock are quick to point out that desert landscaping does not mean "no grass." Turf areas may be smaller, but they're used as an accent, as a means of unifying space. Turf particularly is used to establish more lush micro-climates in private courtyards, gardens or patio areas.

Desert aesthetics

Water issues started the trend to desert landscaping. But it's the growing appreciation of the native desert that's making it increasingly popular.

"Most people still want our environment to look like Orange County, California," Martino says. "But people can really get attached to the desert once they're out here, even though they may not think that in the beginning."

In contrast to the view that the desert must be barren, Martino likes to use desert washes or "arroyos" as a model, particularly for garden areas. Because arroyos catch water, plants are larger and more abundant there. Martino likens it to a "weedy English country garden look with native plants."

Landscape designers can use a plant palette of more than 100 species of trees, shrubs, cacti, ground cover, annuals and grasses. For trees, varieties of palo verdes, acacias and mesquite are common. For shrubs, yucca, creosotebush, jojoba and cassias may be used. For accent, cacti such as saguaro, ocotillo, prickly pear or cholla may be used, though availability isn't always assured. Bursage, brittle bush, verbena and aloe are common ground cover.

Mark Mohlenbrock of Greenworld Nursery Products with a desert plant called a ruellia calfernioa.

One side benefit is, because the native plants offer habitat and tie into the food chain, native creatures reappear. Martino's clients report seeing hummingbirds, coyotes, foxes and javelinas around their homes.

Landscaping challenges

Desert landscaping is not without its challenges. Its maintenance is both an advantage and a problem. While desert plants require less watering, trimming and mowing, some maintenance is required. Owners often don't know what's needed.

'Education of the general public as to what's available is poor.'

—Mark Mohlenbrock

"You really do need to learn all over again how to care for it," Mohlenbrock says. "You may go out and water for a few minutes once a week and your trees die. They're used to once or twice a month deep soaking."

Learning to accept desert plants in their natural, free-flowing form is a challenge for some people. With many desert plants, only dead branches should be removed, but some trimmers tend to give the plants a "haircut," as Martino says.

As with other landscapes, annual grass and broadleaf weeds pose a problem in the native plant landscaping. Decomposed granite does little to crowd out weeds. Among the common weed problems are spurge, pigweed, crabgrass and Russian thistle.

The most practical way to control weeds in desert landscaping is with pre-emergence herbicides. "The key material we use is Surflan," says Jeff Eggen of Scottsdale's Eggen Weed Control. "For many jobs, it's the only pre-emergent specified."

Surface-applied as a liquid, Surflan can be sprayed safely around the base of established plants or broadcast over the top. It is labeled for control of 50 different annual grasses and broadleaf weeds and is safe on 175 different ornamental species.

Occasionally, on a first application where weeds are up and growing, Eggen uses a tank mix of Surflan and Roundup. In one application, Roundup controls the emerged weeds and Surflan provides the residual control to keep new weeds from emerging all season.

Education and supply

One of the challenges facing desert landscapers remains public education.

"The concept has caught on," Mohlenbrock says. "Grass is 'out' but what to do next is a question. Education of the general public as to what's available is poor."

The Arizona Nurseryman's Association is working to change that, Mohlenbrock says. Nursery plants will be marked with tags indicating low water users. The association also has worked with a Phoenix newspaper on articles about selecting and maintaining desert plants.

The Desert Botanical Garden in Phoenix and the Boyce Thompson Southwestern Arboretum in Superior display for public view fine examples of desert landscaping plants. Supplying desert plants also ranks as a challenge to the Arizona landscape industry.

Transplanting desert plants, once considered impractical, is becoming an industry, Martino says. Now plants typically unavailable from commercial sources—large desert trees, saguaro, cholla—are salvaged from development sites and replaced when the development is completed. Or they may be moved to revegetate another site.

"There's a lot of potential as we become more aware of how to use it and grow it," Mohlenbrock says. "Expect to see a lot more creativity in the landscape of the Southwest." **LM**

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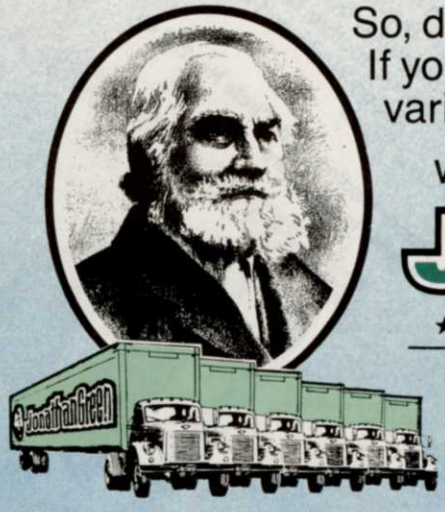

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Circle No. 122 on Reader Inquiry Card

DIVINE DECKS

by Jerry Roche, editor

You want big? We lead off this feature on wooden patios and decks with what Brian Lotz believes is "the biggest deck of its kind in the nation." This is Boardwalk & Baseball near Orlando, Fla., where the former Circus World asphalt was covered with gunbarrel jarrah wood when the amusement park's theme was changed. Lotz, managing director of Timber Holdings Ltd., says that 500,000 board feet of jarrah was selected because of its high-traffic capability. The contract was valued at $900,000, Lotz notes.

The jarrah has been drilled and screwed into aluminum frames to anchor it. Installation of the boardwalk took about three months.

More jarrah is on the way to San Antonio, Texas, area next year when Boardwalk & Baseball owner HBJ Inc. opens another B&B park adjacent to Sea World and Cypress Gardens West.

Timber Holdings Ltd: Circle No. 250 on Reader Inquiry Card

The goal of this project, the Callan residence in Silver Spring, Md., was to provide the clients with a swimming pool and hot tub integrated into a wood deck. Garden Gate Landscaping of Silver Spring took on the task, and won a National Landscape Association Residential Landscape Award.

One of the specifications was to allow access from the first floor of the house to the rear yard. Additionally, the clients expressed an interest in having areas for entertaining and color which would not need a lot of maintenance. The clients also wanted privacy from their neighbors. The problem of standing water created by a low, level topography was solved with an extensive drainage system and the use of a dry well along the rear property.

The Eckstrom family of Melville, N.Y. was having trouble with its backyard recreation area. Problems included rainwater washing into the basement and dying plant material. Enter Schlick Landscaping of nearby Greenlawn. Under the supervision of owner Ronald Schlick, the old 2,000 sq. ft. redwood deck was ripped out. The area was re-excavated to put the swimming pool on a different level than the Eckstrom's house. A drainage system that included a French drain was installed. The decking was re-designed and a hot tub was added. You can see partial results here, a view of the new hot tub area that employs wood fencing and a wooden pergola which helps separate the spa area from the rest of the deck and swimming pool area. Schlick representatives say that the Eckstroms are finally happy, despite having to pay for the job twice—once for the original job and once for the remake.

This is another NLS Residential Award winner, the Trotter residence in Dix Hills, N.Y. as constructed by Atlantic Nurseries, Dix Hills.

The landscape contractor was called upon to create a setting within an atrium, enclosed on all four sides by rooms of the house. A water feature was to be incorporated into the garden. Plants that could be hung with Christmas lights and ornaments during the holiday season were also important, as was some kind of seating.

Clear stain was used on the cedar so that it would contrast slightly with the white siding on the house. The sides of the gunite work were also veneered with the cedar.

The water feature was designed to allow water to cascade from the uppermost level through an intermediate level to a reflecting pool. Great care had to be taken to prevent damage to the interior of the living room and windows during gunniting of the reflecting pool.

All plant materials were chosen for their narrow growth or dwarf habits. And Alberta spruces were used for their Christmas tree-like appearance.

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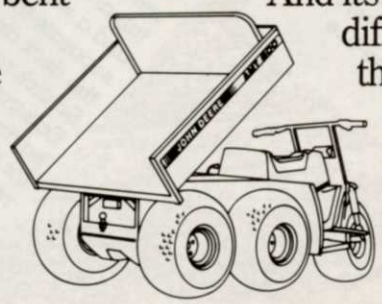

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Location courtesy of the Arizona Biltmore

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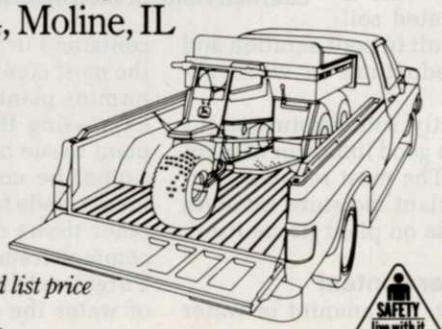

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MEASURING WATER STRESS OF URBAN TREES

Because water is becoming scarce, landscape personnel must be aware of plant moisture needs and of appropriate methods for measuring plant water stress.

by Bruce R. Roberts, USDA

Because city trees are often planted with little regard for their adaptability to the urban environment, they are often exposed to extremely stressful conditions. One important problem is moisture stress, which often occurs in aboveground containers and in other restricted-space planting sites in the metropolitan environment.

A problem with measuring the water status of individual trees is the often poor correlation between soil moisture and plant growth. Because water absorption by tree roots is largely controlled by the rate at which water is lost in transpiration, moisture deficits can develop in trees—even in moist soils. In addition, trees planted in wet sites (a condition not uncommon in many urban areas) may still have water deficits. This is because saturated soil conditions result in poor aeration and subsequent reductions in water absorption.

Trees in the urban environment are often exposed to moisture stress, a situation which frequently occurs in aboveground containers and in other restricted-space planting sites that are characteristic of metropolitan environments.

Consequently, soil moisture status is not always a good indicator of plant water status. The most reliable measurement of plant moisture involves estimates made on plant tissue itself.

Relative water content

Water content, the amount of water contained in plant tissue, is probably the most common method used to determine plant water status. However, expressing the amount of water in plant tissue by itself is impractical; it cannot be compared with measurements made from other plants or from other tissue on the same plant. So a common frame of reference is needed. Turgid weight (the maximum amount of water the tissue will hold) is frequently used as this reference point.

Relative water content (RWC) is determined by obtaining the fresh weight of leaf tissue (either leaf discs or entire leaves) and measuring its turgid weight after an appropriate equilibration period.

Turgid weight is obtained by floating the tissue on water or by placing it on water-saturated polyurethane foam in a moist chamber for a prescribed period of time. The same tissue is then oven-dried to a constant weight and RWC calculated from the following equation:

RWC equals fresh weight minus oven dry weight divided by turgid weight minus oven dry weight times 100.

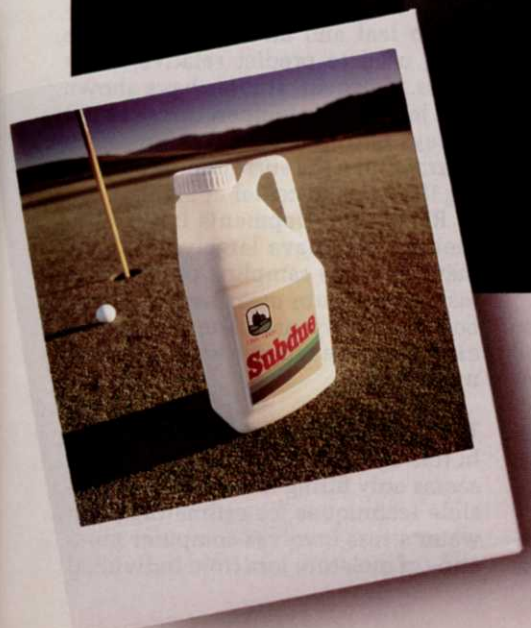
From this equation we can see that RWC provides a measure of water content relative to the maximum water-holding capacity of the tissue (i.e. 100% RWC = 0 plant water deficit).

Thermocouple psychrometry

Thermocouple psychrometry is used to measure the water potential or physiochemical activity of water in a plant system against a base measure of water. As such, it is probably the single best measure of plant water stress available.

In recent years, psychrometers

"Someone put a cart in the 7th fairway pond. My next-door neighbor bought his kid a set of drums. And I just found out my mother-in-law is moving in. But what really concerns me is Pythium."



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Measuring the water status of woody plant tissue using the thermocouple psychrometer technique.

have come into general use and commercial units are available for measuring water potential in the field. Briefly, measurements are obtained by recording the relative humidity in a small, sealed chamber containing the plant sample and a reference thermocouple. The newer psychrometer units use thermocouple transducers which eliminate the need for precise temperature control and make the instrument more practical for field use.

Although some possible sources of error are associated with the psychrometric technique, they can be largely overcome by modifying current technology. Modifications of existing equipment have been made to permit water potential measurements to be made on tree trunks as well as on intact leaves and roots.

Pressure equilibration

An excellent method for measuring water stress of woody plants, particularly in the field, is the pressure equilibration or pressure bomb technique. This procedure, first introduced in 1965, has been widely used in recent years.

In actual operation, a single leaf or leafy shoot is sealed in a pressure chamber with the cut end of the sample protruding outside the chamber. It is exposed to atmospheric pressure. Then pressure is applied to the chamber from a tank of compressed gas until xylem sap appears at the cut end of the sample. The amount of pressure needed to force water out of the leaf cells into the xylem and up to the cut surface is approximately equal to the original water potential of the cells. If consistent sampling and measuring procedures are followed, this method should give very reliable information on the water status of urban trees.

The three techniques previously described have enjoyed wide acceptance and use over the years. This does not mean that other methods are not available for measuring water stress, but most have disadvantages which limit their usefulness for urban trees in the field.

In addition to the aforementioned direct procedures, other indirect methods for estimating water stress may have applicability for use with urban trees.

Stem diameter changes

This procedure uses an instrument developed by scientists at Battelle Memorial Institute referred to as the Ceres device. It is based on the physiological principle that as water moves out of living cells into the transpiration stream, it causes the cells to shrink. This shrinkage in cell size causes a small but detectable decrease in stem diameter.

The Ceres device measures these changes by means of strain gauges and a pressure transducer. As stress increases within the strain gauges, electrical resistance also increases, yielding data on sensitive alterations in stem diameter.

The Battelle instrument is similar in principle to earlier measuring devices referred to as dendrographs or dendrometers, but technology has improved the sensitivity of these newer instruments.

The concept behind the Ceres device and similar measuring systems is based on the cohesion theory. Water confined in small capillaries can withstand very low negative pressure potentials because of the strong attractive forces that exist between water molecules. Thus, microcontraction of water conducting elements occurs when moisture in the plant is subjected to a water potential gradient. The amount of contraction is proportional to the degree of stress.

Leaf temperature changes

Relative differences in moisture stress between plants can be estimated by measuring leaf temperature. This concept can be particularly useful in establishing irrigation regimes for landscape plants in urban and suburban environments.

If transpiration decreases (assuming that other factors such as solar radiation and wind velocity remain relatively constant), the decrease in heat exchange between the plant and the atmosphere will result in an increase in leaf temperature. Thus, a sensitive measure of temperature differences between plants (preferably between plants known to be well watered and others) may indicate transpirational and water status differences. This principle has already been used to measure relative water stress of plants in the field.

One of the problems with using leaf temperature to estimate plant water status is obtaining uniform samples.

It stands to reason that a leaf perpendicular to the sun will be warmer than one at an angle or one completely shaded. Because of this sampling difficulty, in the past the difference between leaf and air temperature has been used to predict relative water stress. However, studies have shown that leaf and air temperatures are not always correlated. Leaves are often warmer than the surrounding air during the day and cooler at night.

Recent developments in infrared thermometry have largely overcome many of these sampling problems so leaf temperature measurements may become a very useful technique for estimating the relative water status of urban trees.

Transpirational modeling

In this age of computer technology, it seems only fitting that one of the possible techniques for estimating plant water stress involves computer modeling of moisture loss from individual

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Measuring the water status of woody plant tissue using the pressure equilibration technique.

tree crowns. A recent study using two species of maple suggests that this technique may have practical application for problems associated with tree maintenance, especially in determining irrigation strategies.

Transpiration water loss is computed by taking the net flux density of incident radiation minus convectional net energy loss minus conductional energy loss divided by latent heat of vaporization of water.

The authors of this research suggest that their model functions best when the modeled trees are under relatively low levels of soil moisture stress.

Summary

The growth and development of urban trees is probably influenced more by plant moisture than by any other single factor. In a time when water resources are becoming scarce, prudent use of existing water supplies becomes an important management decision. Part of this decision process involves understanding the moisture needs of urban trees and learning the methods for accurately estimating the water status of woody plant tissue.

Relative water content, thermocouple psychrometry, and pressure equilibration are recommended as readily-adaptable field techniques for measuring plant water relationships in urban trees. Monitoring sensitive changes in stem diameter, leaf temperature, and transpirational water loss are also potentially useful methods for indirectly estimating plant water status in the field. **LM**

Bruce R. Roberts is research plant physiologist with the United States Department of Agriculture based in Delaware, Ohio.

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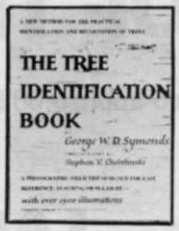

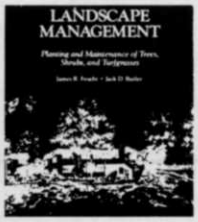

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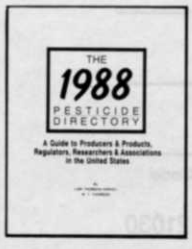

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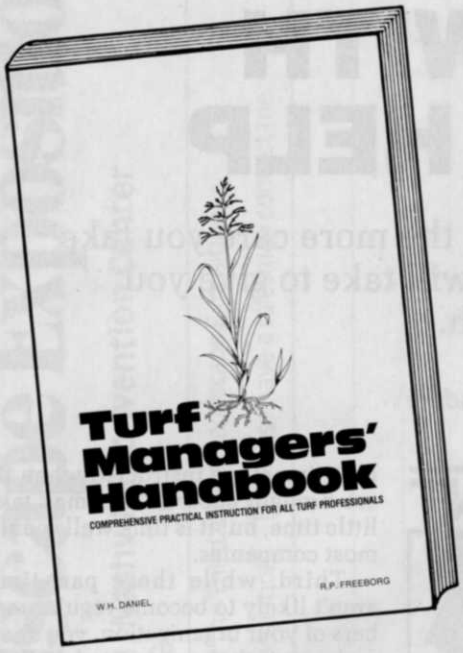

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DEALING WITH PART-TIME HELP

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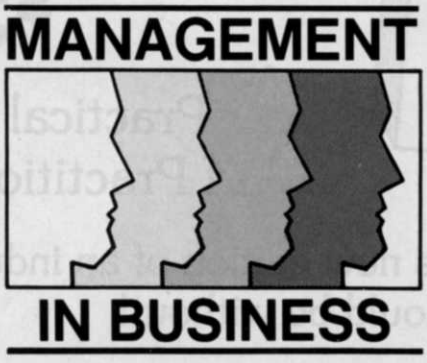
by Rudd McGary and Ed Wandtke

Many companies need to find part-time help to get them through the peak season. These people fill in for full-time people and help perform tasks that have overloaded your regular crews. Several areas should be considered when planning your personnel needs, particularly when you are thinking about part-time personnel.



The considerations

First, you need to determine the type of people you want to hire.

Many companies go through long processes to find their full-time personnel, but fail to take the same care when looking for part-time workers. Since these part-timers are going to be working with your regular employees, you should plan to look for these with as much care as you do your regulars.

Second, too many companies don't plan a hiring process for part-time help. They wait until part-timers are needed and then simply hire the first available people.

As you grow, consider keeping a part-time file. This file lists all the people you have interviewed in the past for part-time jobs, and comments that you may have made when you were interviewing. This will give you a start on finding part-timers who you already know.

Third, ask your regulars if they know people who might be part-time help. Get a list together. Often your best source of part-time help comes from people who work for you. If you have a good working force, you might want to try and find more people like them.

Fourth, you should have a plan indicating when peak work periods are, and then use this plan to determine if you are going to need to hire extra people. This plan can be done with last year's needs as well as planning for the current year. This will help you to prepare for the personnel needs; it is also a valuable document from the standpoint of your operations.

On the job

Having hired your part-time people, several management actions should be considered.

First, the part-timers (unless they are former employees) are not going to be as efficient in their jobs as your regulars. Unless the job is so simple that anyone can do it—and there aren't that many things so simple—you should not expect the part-time people to work the same way your regulars do. Keep this in mind when you plan.

Second, you should be able to tell the part-time people exactly what is expected of them, and you should do this immediately after they are hired. Too many managers forget that the part-timers don't know how to work within the new company. They make assumptions on the level of knowledge and experience the part-timers have.

Managers who find that part-timers are doing work incorrectly, or even the wrong work, are usually frustrated. These frustrations could be avoided by making sure that the part-timers are instructed when they are brought aboard. This may take a little time, but it is time well spent for most companies.

Third, while these part-timers aren't likely to become regular members of your organization, you should make sure they are treated as if they were. The style you use with your regulars should be the one you use with part-timers. Make it is clear to everyone that, although these people aren't permanent members of the organization, they are going to be helping the regulars get their jobs done. Managers with one style for regulars and another for part-timers often ensure a low work rate from the part-time personnel. Treat them the same way. It will pay dividends.

Summary

A growing company will generally have periods when part-time help is useful. Either part-time personnel is going to be used, the regulars are going to be overworked, or someone is going to be hired who might not be fully used. Given the three choices, often hiring part-time help is the correct one. The key then becomes the planning that goes into hiring and the management that is used after the part-time people have been hired.

Since the part-time people are an expense to the company, they should be chosen and managed with care, although it's unlikely that you will spend the same amount of time with part-timers as you would with your regulars. You also might want to consider using part-timers as part of your long-term growth pattern, finding out about new people without giving them full employment.

Whichever way you manage your part-timers, and for whatever tasks, be aware of the fact that these people can be tremendously helpful to the organization. Planning their hiring and managing them professionally will help your organization to grow and be profitable. **LM**

Wandtke and McGary are senior consultants with All-Green Management Associates in Columbus, Ohio. Dr. McGary focuses on marketing and managenent issues. Wandtke focuses on operations and financial questions.

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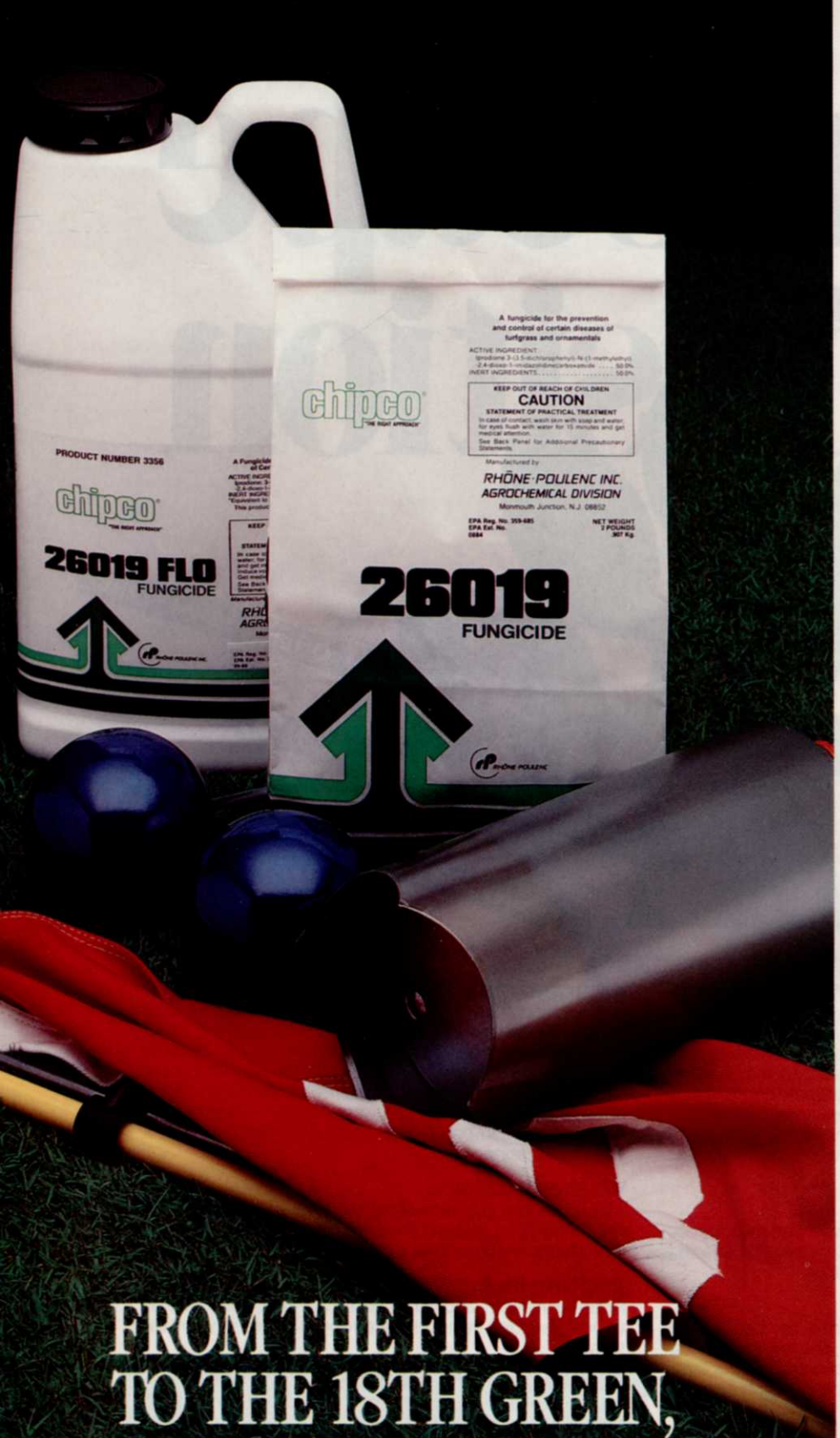

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Growth regulators yield different benefits

by John R. Hall III

Recent research has significantly enhanced our understanding of how turf growth regulators work.

Michigan State work was published by K.V. Hansen and B.E. Branham. It was done on Kentucky bluegrass using radioactive labeled carbon dioxide to determine how photosynthate (food) translocation is altered by applying growth regulators. The researchers compared Limit (amidochlor), Embark (mefluidide), Turf Growth Regulator (paclobutrazol), Cutless (flurprimidol) and an untreated check in both greenhouse and growth chamber studies.

Four weeks after application, mefluidide-treated plots were translocating significantly more food to the root system than all other treatments in the growth chamber study. Amount of photosynthate in the roots varied as noted: paclobutrazol 9%, flurprimidol 10%, amidochlor 15%, untreated check 27% and mefluidide 51%. This would obviously suggest the potential for increased root growth by using mefluidide.

In both studies, one week after application, the paclobutrazol caused significantly greater photosynthate translocation to axillary shoots than any of the other growth regulators. This suggests that paclobutrazol could potentially set the stage for increased turf density.

Two weeks after application, in the greenhouse study, the amidochlor was causing more food to be sent to the crown regions than the other materials. Since the crown region is a major storage area for plant food reserves, it is possible these plants would be in a good position to respond to environmental stresses.

The Ohio State work was published by R.J. Cooper, P.R. Henderlong, J.R. Street and K.J. Karnok. It was done on a perennial ecotype of annual bluegrass, evaluating the effect of mefluidide on seedhead suppression, root growth and turf quality. This work illustrated the effectiveness of mefluidide in suppressing annual bluegrass seedhead formation at very low rates (1/16 lb. AI/A). An 80% reduction in seedhead formation was brought about 45 days after treatment at the above rate. Double this rate only increased seedhead suppression 18%. Mefluidide is the most economically effective seedhead suppressor available for fine turf.

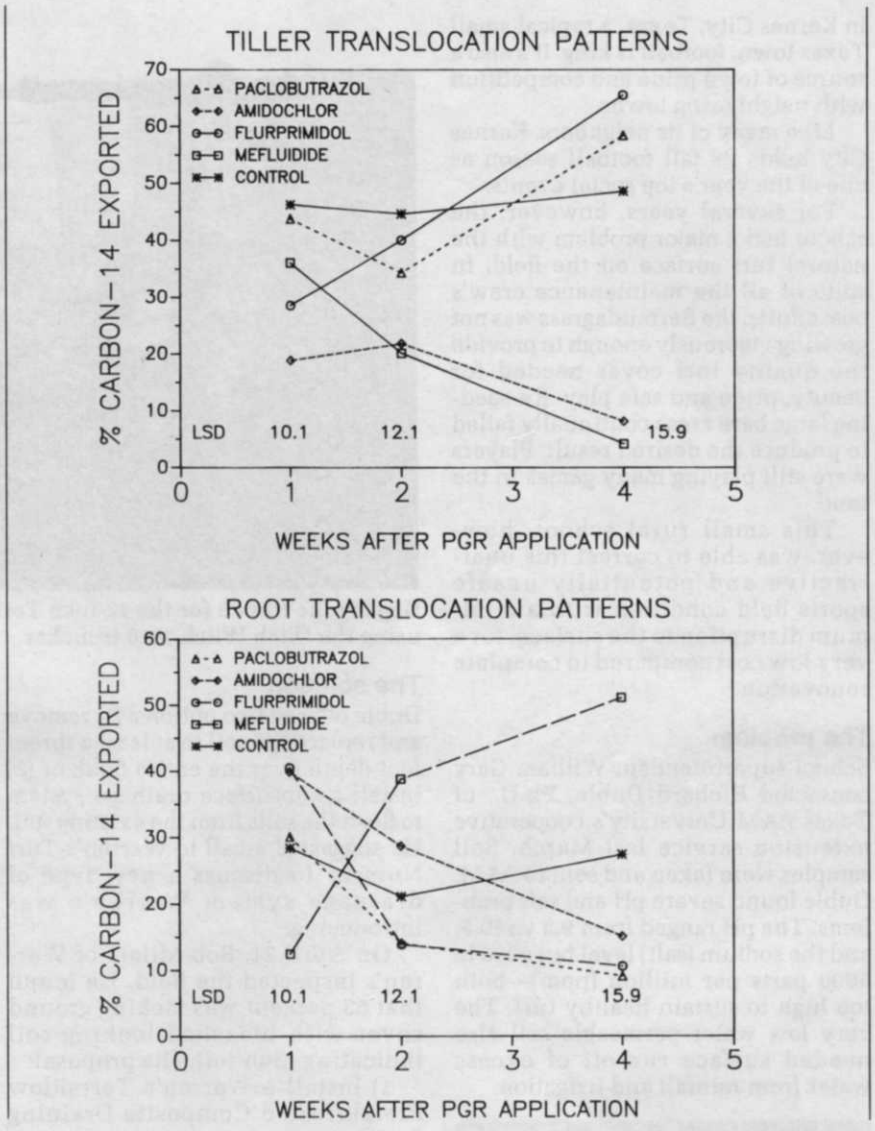
The impact the 1/16 lb. AI/A rate had on root elongation rate (millimeters growth per root per week) was most striking. A March 31st treatment at the above rate led to significantly greater root growth rates when measured on April 13 (89%), May 25 (62%), July 13 (102%) and August 3 (1375%) when compared with untreated plots.

This increased growth rate was reflected in the effect on maximum rooting depth in the annual bluegrass. When maximum rooting depth of the annual bluegrass was measured on August 3, following the March 21 treatment, the treated plots had five times more root system than the untreated (2.75 inches vs. 0.51 inches).

The 1/16 lb. AI/A rate did produce some yellowing which reduced quality slightly, 14 to 45 days following application. However, quality was significantly better on the mefluidide-treated plots 45 to 70 days after the application.

The Michigan State and Ohio State work have illustrated some very important differences in growth regulators. Each material apears to have a slightly different effect on photosynthate partitioning in the Kentucky bluegrass plant. Turf professionals can certainly benefit from being aware of these effects and using them to their advantage. By choosing the right growth regulator for your situation, you can get seedhead suppression, enhanced root growth, increased density or potential for stress survival. **LM**

MICHIGAN STATE RESEARCH



John R. Hall III is extension agronomist in turfgrass management at Virginia Tech University.

New drainage technology solves field woes

In Karnes City, Texas, a typical small Texas town, football is king. It's also a source of town pride and competition with neighboring towns.

Like many of its neighbors, Karnes City holds its fall football season as one of the year's top social events.

For several years, however, the school had a major problem with the natural turf surface on the field. In spite of all the maintenance crew's best efforts, the Bermudagrass was not growing vigorously enough to provide the quality turf cover needed for beauty, pride and safe play. Re-seeding large bare areas continually failed to produce the desired result. Players were still playing many games in the mud.

This small rural school, however, was able to correct this unattractive and potentially unsafe sports field condition with a minimum disruption to the surface, for a very low cost compared to complete renovation.

Digging the trench for the 12-inch TerraFlow trunk line along one sideline using the Ditch Witch 1010 trencher.

The problem

School superintendent William Gary contacted Richard Duble, Ph.D., of Texas A&M University's cooperative extension service last March. Soil samples were taken and sent to A&M. Duble found severe pH and salt problems. The pH ranged from 9.5 yo 10.5, and the sodium (salt) level ran 4000 to 5000 parts per million (ppm)—both too high to sustain healthy turf. The very low water permeable soil also needed surface run-off of excess water from rainfall and irrigation.

Installing the TerraFlow system laterals. The white areas are where turf was not able to survive because of high salt.

The solution

Duble offered two options: (1) remove and replace the soil to at least a three-foot depth over the entire field; or (2) install a subsurface drainage system to flush the salts from the existing soil. He suggested a call to Warren's Turf Nursery to discuss a new type of drainage system Warren's was introducing.

On April 21, Bob Milam of Warren's inspected the field. He found that 65 percent was lacking ground cover with bleached-looking soil indicating high salt. His proposal:

1) Install a Warren's TerraFlow Prefabricated Composite Draining System.

2) Aerate and fertilize with Warren's 18-5-8 30% SCU fertilizer.

3) Apply a 90 percent sulfur dispersal.

4) Flush with four to five inches of water per week for four weeks.

5) Re-sod the remaining bare areas with Warren's Bermudagrass sod from its Little River Sod Farm at Buckholtz, Texas.

The implementation

Work began June 17.

The TerraFlow Drainage System was installed in a herringbone pattern down the length of the field. Because of an 18-inch crown, the TerraFlow merely followed the slope of the field from the crown to the sidelines. All trenches were backfilled to within two inches of the surface with coarse washed sand to facilitate rapid water draw-down from the surface.

Trenching using a Ditch Witch 1010 trencher took 45 man/hours. TerraFlow installation took 100 man-hours. Sand backfilling took 60 man/hours. The trenching spoils were bladed with a tractor into the remaining two inches of the trenches, requiring six hours of tractor/operator time. The excess soil was removed from the site using a front-end loader and 20 man/hours.

Total materials used: 6,200 lineal feet of six-inch TerraFlow, 950 lineal feet of 12-inch TerraFlow, 10 rolls of duct tape, 36 feet of eight-inch PVC pipe and 35 yards of course sand. Total cost was about $11,800.

After the flushing and treatment program, the school reported a dramatic improvement in quality of the existing turf. On Aug. 6, 3900 sq. yds. of common Bermudagrass was sodded. The new field was irrigated with two inches of water once a week until mid-September, about a week after the first game.

The result

With a simple installation of this new technology in drainage, the Karnes City school system was able to solve the untenable soil/salt problem and receive a permanent efficient drainage system. At last report, school officials proclaimed the field "the best ever." **LM**

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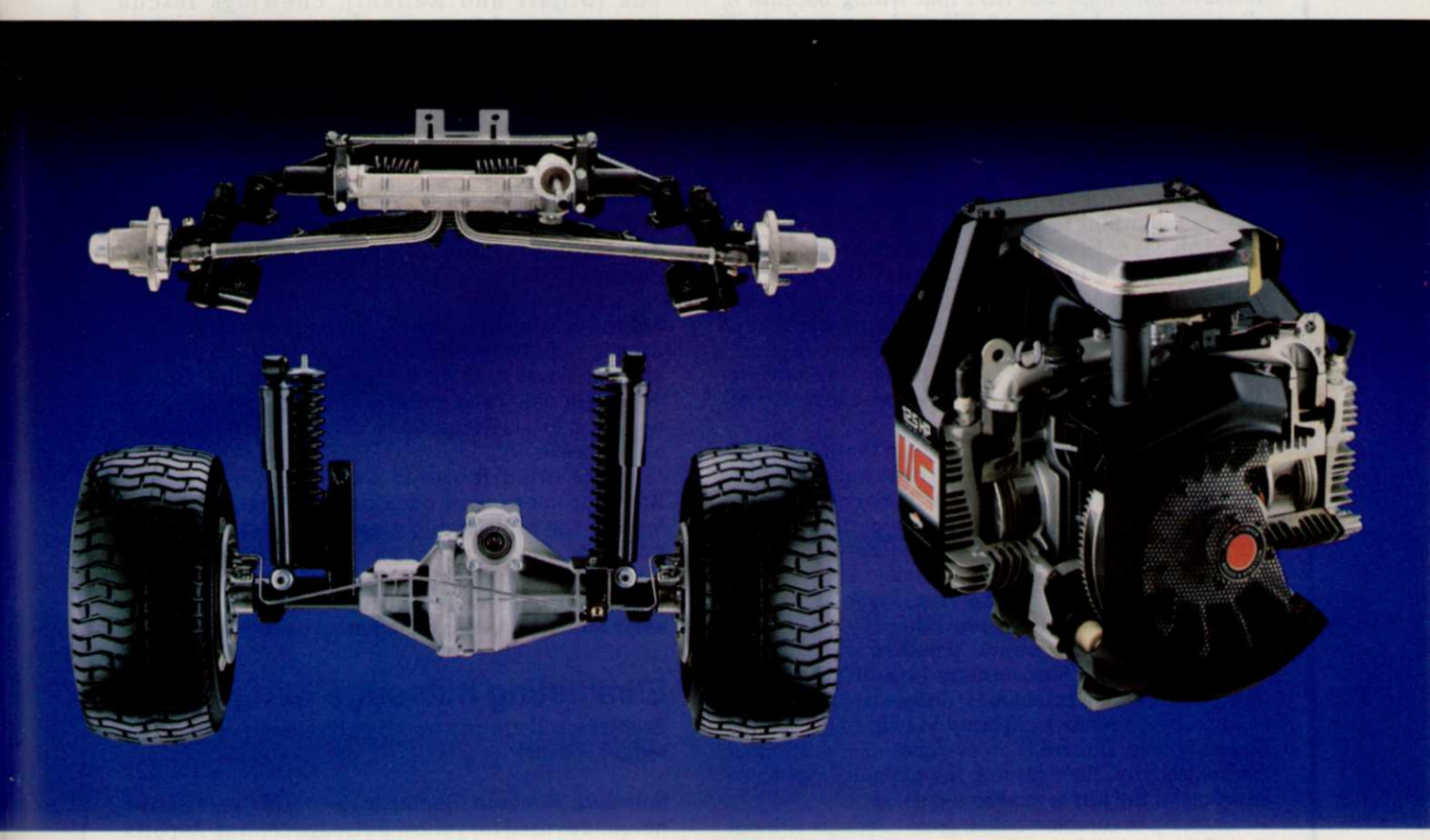

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Circle No. 114 on Reader Inquiry Card

PROBLEM MANAGEMENT

by **Balakrishna Rao,** Ph.D.

To leave or not to leave

Problem: *I've read opinions on leaving grass clippings on mowed lawns. Some people believe it's okay to leave clippings. But isn't that wrong because of disease development? What is your belief? (Washington)*

Solution: Yes, I agree with your belief that if there is a potential for disease development, grass clippings should be removed. These leftover diseased portions can serve as the inoculum source for the future spread of the disease from one area to another.

It is important to recognize that having the diseased blades or fungal agent(s) alone is not enough to cause or spread the disease. For any disease to be active, three factors must be present: a susceptible plant (host), a virulent pathogen (agent) capable of causing a particular disease, and a favorable environment. Pathologists refer to this as a disease triangle. If any one of these is not present, a disease will not develop or establish.

Therefore, it is possible that even though a given disease was active in one month or in one season, as the temperature changes that particular disease may not continue to be active, even though the susceptible turfgrass and fungal agents are still present. However, the disease may become active in another time during the same or future growing season(s) if proper environmental conditions prevail.

In summary, the cultural practices and environmental conditions often contribute to pathological disorders. So, if there is a potential for disease development, it is advisable to remove clippings to help minimize the disease spread. If there is no evidence of any potential disease activity, then leaving the clippings would be beneficial if the turf is mowed regularly.

Contrary to common belief, grass clippings will not contribute to thatch development unless the clippings are too long. Clippings can supplement the soil nitrogen when they decompose and release nutrients. If the clippings are very long, decomposition may take a long time, which may contribute to thatch buildup.

Shady cultivars

Problem: *What cultivars of turfgrass require little or no sunlight? (Illinois)*

Solution: There are a number of turfgrass cultivars which are adapted well to shade situations. The important thing is to determine the amount and duration of shade and light.

In the North, several Kentucky bluegrass cultivars, such as Bristol, Glade, Nugget, Touchdown and Birka, have shown good establishment under less than 70 percent shade. These cultivars would do better with more light. Areas with more than 70 to 80 percent shade, tall fescues and fine fescues have shown good establishment. If the shade is above 85 percent, it would be difficult to grow turfgrass.

Consider using some improved turf-type tall fescues such as Rebel II, Falcon, Mustang, Arid, Jaguar, Cimarron or Bonanza.

Some of the fine fescue varieties with good shade and root competition, drought tolerance, and winter hardiness include: sheeps fescue (Bighorn), hard fescue (Biljart and Reliant), chewings fescue (Jamestown and Banner) and creeping fescue (Fortress, Ruby and Ensylva). These are some of the cultivars to choose from. Contact your local county extension office for any available list of turfgrass cultivars for shade.

Getting the zoysia out

Problem: *How do you go about removing zoysiagrass and keeping it out of a fescue lawn without causing damage to the fescue or soil? (Kansas)*

Solution: I am not aware of any product which can be used to remove zoysiagrass selectively from a fescue lawn without causing damage to desirable turf. If you must get rid of zoysiagrass, the best approach would be to use Roundup to kill everything and start a new lawn.

Quite often it would be necessary to apply Roundup more than once before installing a new lawn if the undesirable grass continues to present problems. Zoysiagrass is an aggressive grass which multiplies by producing rhizomes, stolons and by tillering. Therefore, repeat applications may be necessary to manage this problem.

Eliminating nutsedge hedging

Problem: *Is there any weed control that will stop nutsedge? (Texas)*

Solution: Basagran (Bentazon) is one of the effective herbicides used for yellow nutsedge control. Reports indicate that generally it may take three to five years to manage the nutsedge problem effectively. This is because of the way the plant grows. It produces underground bulbs which may not get affected with the first treatment. Therefore, repeat applications as needed when nutsedge presents a problem.

In the South, yellow nutsedge can emerge throughout the year, therefore can be treated any time.

Prograss EC herbicide will reduce competition from yellow and purple nutsedge. It is intended to be used on cool-season turfgrass like perennial rye, Kentucky bluegrass, and creeping bluegrass. To avoid injury to desirable warm-season turfgrass, spot-treat between December 1 and February 1. However, the results may vary depending upon the active weed growth and soil moisture.

Balakrishna Rao is Manager of Technical Resources for the Davey Tree Co., Kent, Ohio.

Questions should be mailed to Problem Management, LANDSCAPE MANAGEMENT, 7500 Old Oak Boulevard, Cleveland, OH 44130. Please allow 2-3 months for an answer to appear in the magazine.

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Circle No. 119 on Reader Inquiry Card

PRODUCTS

Lawn mower starter for restoring power

Specially formulated for 2- and 4-cycle engines, Blaster Lawn Mower Starter & Tune-Up restores power and compression without using dangerous ethers. The new starter/tune-up removes carbon, gum and varnish deposits from the engine as soon as added.

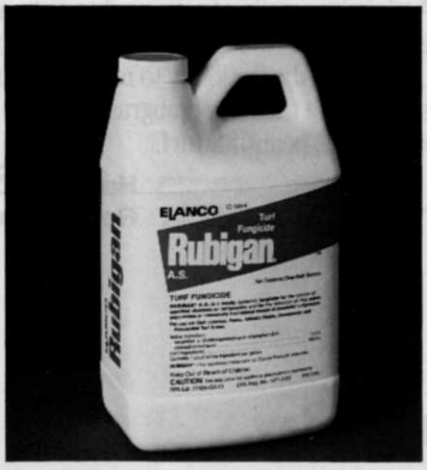
Blaster instantly cleans the engine to allow it to run smoother. It frees

rings and valves, removes moisture and prevents vapor lock. The product is ideal for snowblowers, tractors, chain saws, snowmobiles, outboard engines and engine layovers.

Circle No. 190 on Reader Inquiry Card

Fungicide available in new liquid form

A new liquid form of Rubigan is available from Elanco. Rubigan AS controls dollar spot on tees, greens and fairways for up to 28 days, and is labeled for all patch diseases. A tank mix of Rubigan and Daconil



2787 also controls large brown patch.

Rubigan AS has local systemic action on both warm- and cool-season grasses and remains effective after drying on foliage in the event of rain or irrigation. Less than 2 oz. of Rubigan AS per 1000 sq.ft. will control dollar spot from 14 to 28 days.

Circle No. 191 on Reader Inquiry Card

Hydraulic systems drive triplex, 5-, 7-gang mowers

Ransomes' new triplex GT greens mower has a cutting width of 66 inches. It is offered with nine knife greens cutting units and a choice of optional units for tees mowing, verticutting and vibra-spiking.

The mower is entirely hydraulic, with hydrostatic drive and hydraulically-operated cutting units. Reverse drive provides backlapping units.

A single pedal raises or lowers the cutting height hydraulically with an electronic control. A digital readout gives cuts per meter.

The model 340TG is a five-gang mower and the 465TG is a seven-gang mower.

The trailers are self-contained and quick hitch models with a built-in hydraulic system to drive cutting reels and raise and lower cutting units.

Electric controls are in the cab. The mowers are equipped with either fixed or floating heads. The 340TG cuts an 11-foot-plus path, the 465TG a 15-foot-plus path.

Circle No. 192 on Reader Inquiry Card

Light fairway mower uses five reel gangs

A new lightweight fairway mower was introduced earlier this year by Jacobsen. The LF-100 is a durable, out-front five-gang reel mower that gives a greens-quality cut on fairways. It cuts a 100-inch swath at speeds up to 5 mph for higher productivity.

A new mower configuration puts the two outside reels in front of the operator, so the trimming edge is easily seen without looking back and away from the mowing path. It also provides a shorter uncut circle of grass on turns, and makes grass catcher removal and reel maintenance much easier.

The LF-100 has a 22 hp, three-cylinder diesel engine.

Circle No. 193 on Reader Inquiry Card

Riding aerator features 'on-the-go' adjustment

A new Riding Aerator, the Ryan GA-30, features variable core spacing from 2½x1 inches to 2½x5 inches or anywhere in between, and the operator can vary the spacing with a hand lever *while aerating*.

The throttle, choke and ignition switch are also hand-operated while speed, brakes and lift control for the aerating head are controlled by foot pedals. The machine has hydrostatic drive, and transport speed is 6 mph, nearly double that of other aerators.

Circle No. 194 on Reader Inquiry Card

Transplanter allows varying rootball sizes

The Dakota Hand from Mid Dakota is a towable transplanter for bucket mount on three-point hitches. The main frame and spade system allows the operator to vary the size of the rootball up to a 28-inch diameter.

Also adaptable to the mainframe are a log-splitter, hydraulic dump wagon and sprayer which are all interchangeable.

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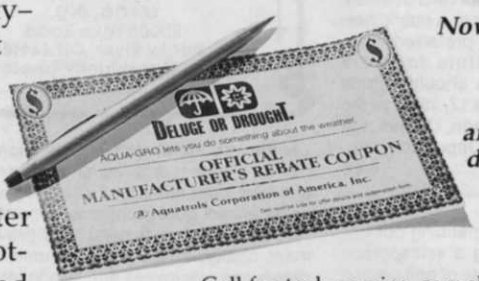
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We are looking for a Landscape Foreman with experience in leading and working with installation crews. Duties include job estimating, reading blueprints, staking jobs, and pruning. We are located in the heart of the Blue Grass State of Kentucky. Family owned business since 1841. Benefits include paid vacation after 1 year, health insurance plus profit sharing. Your salary is negotiable depending on experience. Contact Stephen Hillenmeyer, C/O Hillenmeyer Nursery, 2370 Sandersville Road, Lexington, KY 40511. 6/88

Grounds/Horticulture Specialist - Oberlin College invites applications for the position of a Grounds/Horticulture Specialist. This is a full-time, 12-month, position reporting to the Grounds Supervisor and will be responsible for maintaining a portion of the campus both as a functional landscape and as an educational collection of herbacious perennials, groundcovers, shrubs and trees. During the winter snow removal and pruning will be performed by the individual in this position. Three to five years of experience in a public horticultural garden, estate or park preferred. Specialized training may substitute for work experience. Interested persons should submit cover letters and resume by June 17, 1988, to the Office of Personnel, Oberlin College, Oberlin, OH 44074. Affirmative Action/Equal Opportunity Employer. 6/88

IRRIGATION SALES - We are expanding our Irrigation Division, and are seeking a salesperson experienced in design and/or sales of golf course and commercial irrigation systems. Excellent benefits and growth potential. Please send resume to: S.V. Moffett Co., Thruway Park Dr., West Henrietta, NY 14586 Attention: Ken White. 8/88

PESTICIDE APPLICATOR: Quality-oriented Colorado landscape firm seeking motivated individual. Insect and disease knowledge of western turf and ornamentals essential. Interior pest control very helpful. Responsible for field work, sales, scheduling, purchasing, and P.R. Benefits and partial moving expenses offered. Send resumes to Perfection, 1495 Ford, Colorado Springs, CO 80915. 6/88

IRRIGATION DIVISION MANAGER: Relocate to beautiful Minnesota. Top Mpls. commercial landscape co. needs experienced irrigation professional familiar with all aspects of design and installation. Salary and benefits commensurate with ability and experience. Position immediately available. Send work/salary history to: Minnesota Valley Landscape, 9700 W. Bush Lk. Rd., Mpls., MN 55438. (612)944-1626. 6/88

Landscape Supervisor: Established Michigan Contractor looking for self-motivated individual with 5 years minimum experience to manage crews and oversee landscape installation. Send resume and salary requirements to: DeAngelis Landscape Incorporated, 22425 Van Horn Road, Woodhaven, Michigan 48183. 6/88

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LECTURER, Ornamental Horticulture Department, School of Agriculture is seeking a full-time lecturer for the 1988-89 academic year. Duties and responsibilities may include teaching park planning and management, landscape design, plant materials, and other undergraduate courses in ornamental horticulture. A Master's Degree required; Ph.D. preferred, in ornamental horticulture or closely-related field with emphasis in landscape design, landscape management plus professional experience. Salary is commensurate with qualifications and experience. Interested, qualified individuals should submit official Cal Poly application and resume to Ronald D. Regan, Head, Ornamental Horticulture Department California Polytechnic State University, San Luis Obispo, CA 93407. Deadline for receipt of application is June 24, 1988. Affirmative Action/Equal Opportunity/Title IX Employer. 6/88

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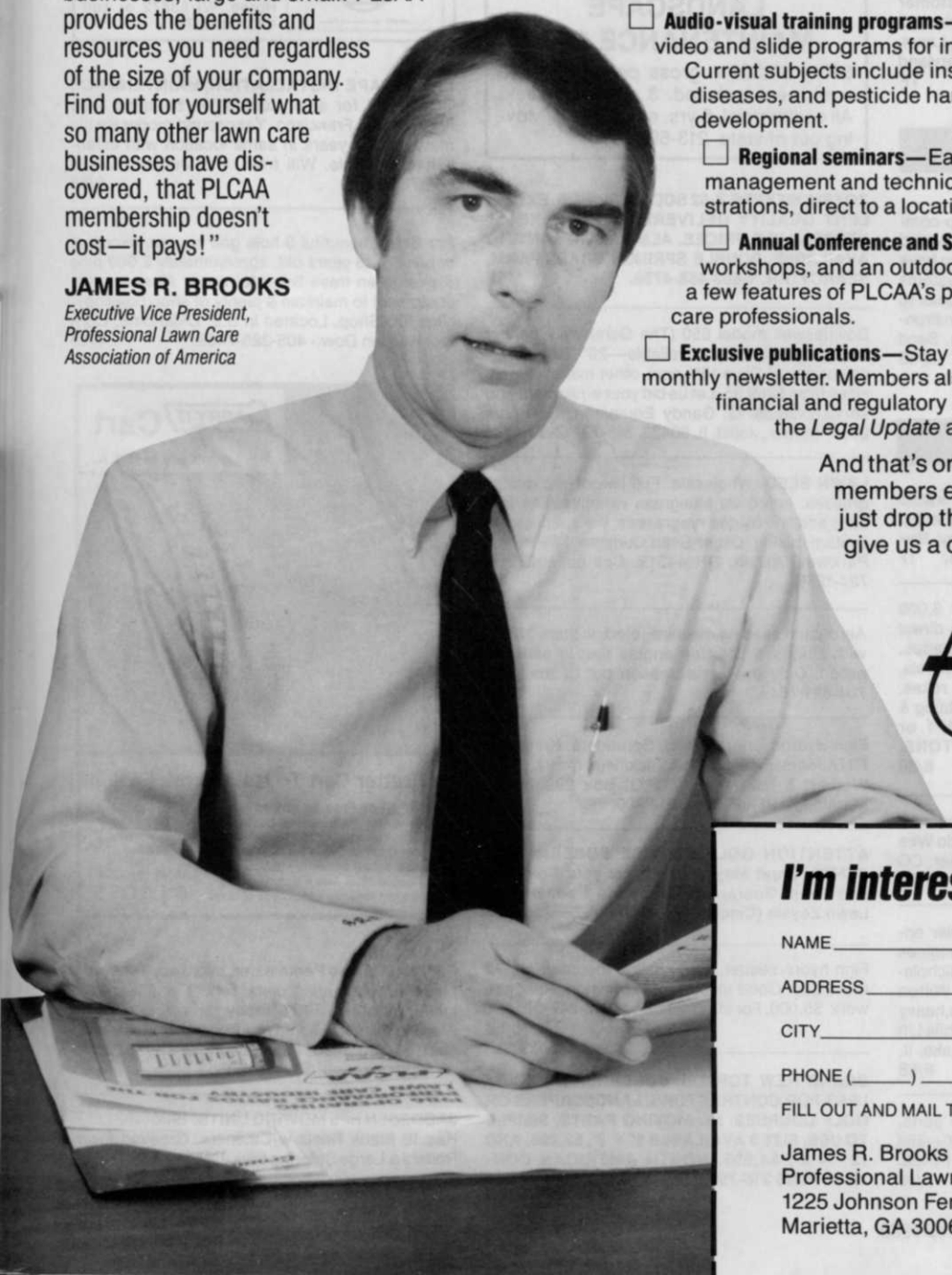

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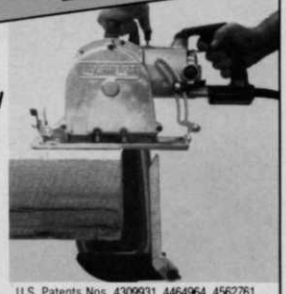

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Selling landscaping

Are you selling your company's services effectively? Maybe you are. But maybe you're not doing the whole job.

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"Until recently in this country, we typically hadn't been conditioned to consider the long-term impact of landscaping," says Mark Hunner, regional vice-president at The Brickman Group, Long Grove, Ill.

Many developers, and even homeowners, want to leave a valuable and lasting legacy—witness the recent rise of campus-like environments for planned residential communities and commercial and industrial developments. And landscaping makes a difference.

"It's the landscape and exterior architecture that make the first and most important impression," says Hank Ecker, president of GSL Management in Oregon. "Interior amenities are always important to tenants, but they don't grab people off the streets. And if they don't come off the streets, we can't make the sale."

The better companies—like Brickman—are recognizing the value of selling a good-looking landscape.

"This 'total environment' approach to development aims for an improved quality of life, not only for current residents or employees, but for future generations as well," explains Hunner.

Brickman is working closely with Romeo Mura, president of McIntosh Development on two projects. "We see Brickman's landscape designs as an important part of our total marketing plan," Mura notes. "In addition to helping us sell faster and better, the landscaping also establishes and carries the McIntosh reputation to the next product, the next development."

Professional landscaping is really beginning to catch on. So it's not quite such a hard sell as it might have been a few years ago. But it's still a selling point.

Now let me ask you again: are you selling your company's services effectively?

Jerry Roche

Jerry Roche, editor

Questions and comments are encouraged.
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